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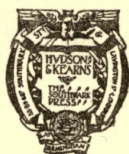
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ECONOMIES IN DAIRY
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ECONOMIES IN DAIRY FARMING

BY

ERNEST MATHEWS



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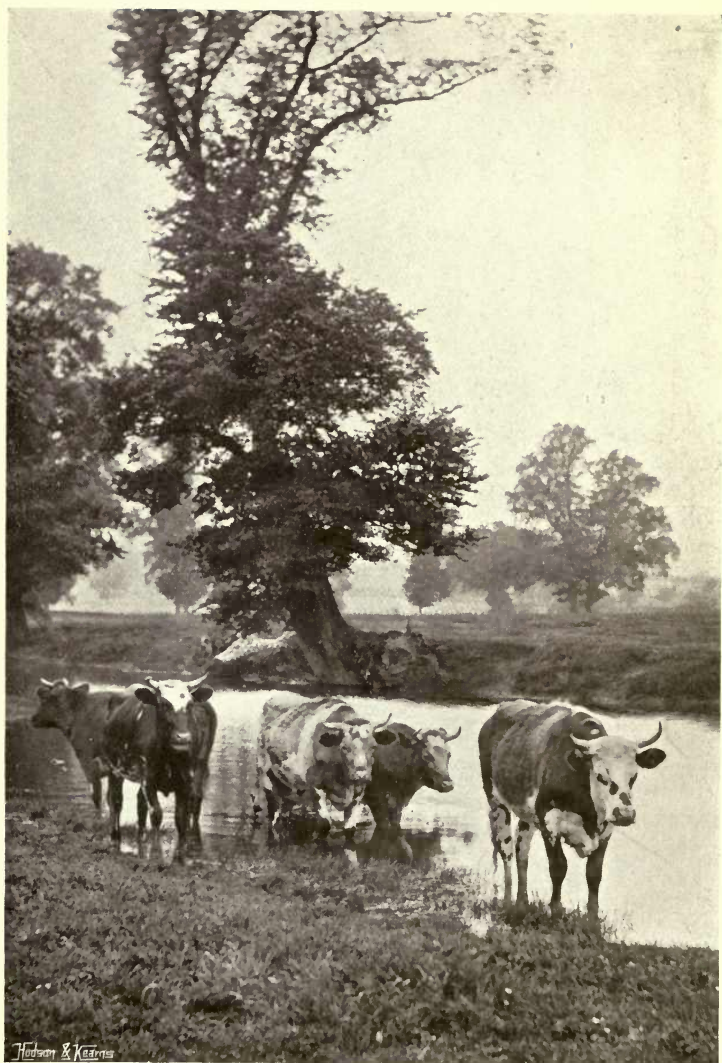
GENERAL

TO

THE RIGHT HONOURABLE

LORD ROTHSCHILD





IN SUMMER HEAT.

P R E F A C E

SOME two years since, I was asked by the Proprietors of *Country Life* to write for them a book on Dairy Farming.

Although flattered by such a request, at that time I felt obliged to decline because my time was fully occupied, and also it appeared to me that so much having been already written on the subject by older and more experienced men, to write anything on the same lines would be a work of supererogation.

Thinking over the matter subsequently, in connection with the Butter Test and Milking Trials with which I have been associated during the past ten or twelve years, and recollecting the short, indeed, almost meagre reports which have been given of each such trial (not at all commensurate with the expenses incurred in carrying them out), I felt that perhaps it was my duty to detail at greater length my experiences generally with regard to the whole question of "manufacturing" milk, as noted from time to time by me at those trials. Hence the following pages.

The judge at such trials is placed in an exceptional

position. He has first of all the charge of all the cattle for at least two days, and during that time has frequent opportunities of examining them. He notes the weights of the milk yielded by each cow and the dates of their last calving. He further ascertains by churning, or analysis, the value of each lot of milk, and putting these last three items of information together he can, by examination of the cows, see whether those who give the best results have any peculiarities in common, and by taking notes and comparing the different animals, he is able to find out for himself the special characteristics of a butter and milk cow.

Having tested over 1500 cows, and taken stock of them in this way, noting their several performances, I have put down in the following pages my views generally on the matter.

To write is one thing, to illustrate is quite another ; and I feel that no words are required from me to point out all the care and trouble that has been taken to secure good and typical illustrations. To Mr. P. Anderson Graham, the Editor of *Country Life*, I owe a deep debt of gratitude for kindly advice, helpful suggestions, and general supervision of the whole of the work, without which the book would have been very different.

One word as to price. The cost of producing a book of this size, with the numerous photographs, all taken from life, is heavy, but as it is a

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book for Farmers, the selling price has been put as low as possible, so that it may be within the reach of all. The work on my part has been a labour of love, and the Proprietors of *Country Life* have kindly promised, should there be any surplus after paying a fair profit on the expenses incurred in publishing it, to hand over the same to the "Royal Agricultural Benevolent Institution."

ERNEST MATHEWS.

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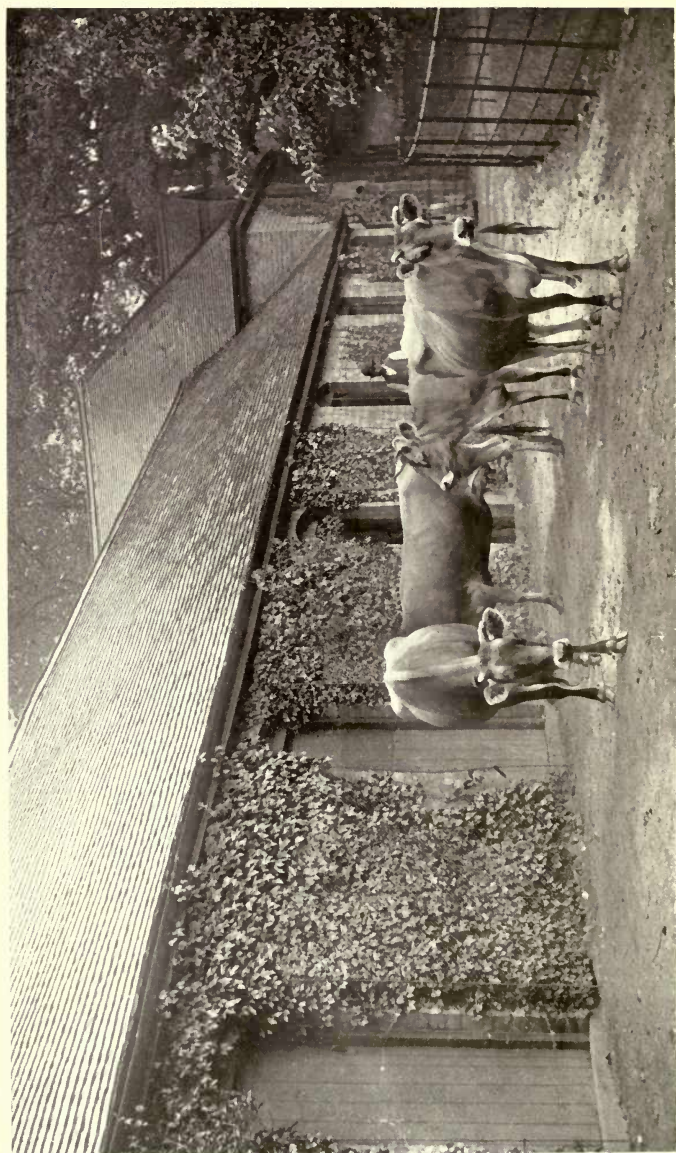
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MILKING-TIME.



ECONOMIES IN DAIRY FARMING

CHAPTER I

QUALITY AND PECULIARITIES OF MILK

As the dairy farmer of to-day has to supply milk up to an official standard of quality, it is necessary that he should know something about its composition and peculiarities.

Competition is so keen, and the damage done by a successful prosecution in a police court so serious, that no farmer supplying milk can afford to carry on his business in a half-hearted way; consequently to succeed he must study every economy, and at the same time send out milk that is well above the limit fixed by the Board of Agriculture. His first care, then, should be to make himself acquainted with the composition of milk, and the various causes which may affect its quality.

Cows' milk is composed of water, albuminous bodies, and butter fat, with sugar and mineral salts, which are usually classified by analysts under the three following headings, viz.: (1) Water, (2) Fat, (3) Solids other than fat.¹

The average composition of the whole day's milk

¹ Fleischmann's "Book of the Dairy," Aikman & Wright, 1896.

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of large herds in North Germany, according to Fleischmann, is as follows, the water being omitted :—

Fat	3.25
Solids other than Fat	8.75
Total	<u>12.00</u>

The average composition of milk taken from 200,000 analyses made in the laboratory of the Aylesbury Dairy Company is given in Mr. Richmond's book on "Dairy Chemistry" as follows :¹—

Fat	3.90
Solids other than Fat	8.90
Total	<u>12.80</u>

The Sale of Milk Regulations, 1901, which came into force under an order of the Board of Agriculture on the 1st of September in that year, fixed 3.0 per cent. of fat and 8.5 per cent. of solids other than fat as the limit below which, until the contrary is proved, milk is to be presumed as not genuine. In the case of the fat being under 3.0 per cent., where a prosecution takes place, the charge is that of abstracting fat ; and where the "solids other than fat" are below 8.5 per cent., the charge is of adding water.

As a general rule milk showing 3 per cent. of fat is not deficient in "solids other than fat." Where such a case occurs it is usually attributable to causes that can be prevented, which will be discussed later on. Mixed milks, *i.e.* the milk from a herd of cattle, should in my opinion never show "solids other than fat" less

¹ "Dairy Chemistry," by Henry Droop Richmond, 1899.

PECULIARITIES OF MILK 3

than 8.5 per cent. unless there is something very wrong in the general management of the cows. The average "solids other than fat" in the milks of the following breeds of cattle entered in the London Dairy Show trials from 1891 to 1901 are all above 8.98 per cent.: Shorthorns, Jerseys, Guernseys, Red Polled, Ayrshires, Kerries and Dexters, and Cross-breds.

FAT IN MILK

The real test of the value of milk is its richness in butter fat. Analyses show that there are very wide differences between the milks of the various breeds of cattle mentioned above, which, if reduced to their money value, would show as much as 50 per cent. in favour of some over the others. An example will make this clear. At one of the trials at the Dairy Show two cows competed whose milk, when analysed, gave the following figures :—

	Weight of Milk.	Fat Percentage.
First Cow	2 $\frac{3}{4}$ gallons	2.43
Second Cow	1 $\frac{3}{4}$ „	6.83

Assuming the value of milk containing the regulation 3 per cent. of fat to be worth 6d. per gallon—that is, estimating the unit of fat to be worth 2d.—the value of the milk of the first cow would be worth about 5d. per gallon, while that of the second would be worth about 1s. 1 $\frac{1}{4}$ d. per gallon ; consequently the value of the milk of the first cow would be only

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1s. $1\frac{3}{4}$ d., while the value of the second would be 2s., or a difference in favour of the cow yielding the smaller quantity of milk of $10\frac{1}{4}$ d.

This example is of course given only as an extreme one, and to show the importance of ascertaining the value of milk containing a large percentage of fat; but as it is usual, where milk is sold to creameries, to make the percentage of butter fat the basis on which the value of the milk is calculated, perhaps this "extreme" instance will serve the purpose for which it was introduced.

The percentage of fat in milk can be easily ascertained by either the "Babcock" or "Gerber" methods, but as these are not always available, a few remarks on the nature of fat in milk may not be considered out of place.

THE FAT GLOBULES IN MILK

Fat in milk is present in the form of small globules, invisible to the naked eye, which vary in size from one micron to twenty-four microns.¹ A micron is the $\frac{1}{1000}$ part of a millimetre, and is represented by the Greek letter μ . The composition of these globules is not thoroughly known, as there is undoubtedly something present in the larger globules which is not present in the smaller ones, or if present, is in such minute quantities that its value is almost nil. Whatever it is, it has a great effect on the colour and

¹ Lloyd on the Fat Globules in Milk (*Bath and West of England Journal*, vol. xiii. 1901-2).

quality of the butter, but hitherto analysis has not brought it to light. In the article referred to Mr. Lloyd shows that the size of the fat globules varies considerably with the breed of cow, and to these differences of size can be traced the superior churnability of some milk to others.¹ But as it is not always possible to examine milk through a microscope, other peculiarities must be looked for.

COLOUR OF MILK

If two samples of milk, one rich and the other poor, as shown by analysis, are passed through the same separator under similar conditions of temperature and speed, and the two lots of cream are kept for twenty-four hours, it will be seen that the richer milk has produced the richer and deeper-coloured cream, although in both cases the separated milk will be the same in colour. The richer cream will also be the thicker of the two, and will yield more butter in proportion than the poorer, while the butter will be better both in flavour and colour. If these two milks were originally examined under a microscope, the richer of the two would be found to contain fat globules of large and uniform sizes. An experiment of this kind goes a long way towards explaining the practice adopted by many milk-sellers of colouring milk, and why the inferior butters are similarly treated.

¹ Report on the Churnability of Cream Trials (*Bath and West of England Journal*, 1901-2 and 1902-3).

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VARIATION IN QUALITY OF MORNING AND EVENING MILK

Another peculiarity which attaches to the fat in milk is that the percentage of fat does not increase *pari passu* with the larger quantity of milk that is usually given by cattle in the morning, after a rather longer interval than that between the morning and evening milking times. Yet although the percentage of fat does not advance with the milk, the actual weight of fat is almost identical in the two milkings. This is very clearly shown in Mr. Lloyd's report of the London Dairy Show milking trials in 1900, which are given below :¹—

Average actual Weight of Fat produced per Cow per Day

Breeds.	No.	Morning. Lbs.	Evening. Lbs.
Shorthorns	26	.82	.87
Jerseys	25	.75	.82
Guernseys	10	.79	.76
Red Polled	8	.72	.77
Kerries and Dexters	12	.57	.54
Cross-breds	7	.87	.81

The milk in all these cases was taken at intervals of thirteen and eleven hours.

This difference between the quality of the morning and evening milk is a very difficult problem for the milk-supplying farmer to solve, the impossibility of getting equal periods of time to elapse between the

¹ *Journal of the British Dairy Farmers' Association*, vol. xv.



JERSEYS AT PASTURE.



two milkings being almost insuperable, owing to the labour and transit questions; it will, however, be referred to again later on.

QUALITY OF THE MILK OF VARIOUS BREEDS OF CATTLE

The connection between the different breeds of cattle and the quality of the milk they yield is now pretty widely known, thanks to the milking and butter test trials which have taken place at many of our leading agricultural shows during the past ten years, notably the Bath and West of England, the Tring, and London Dairy Shows.

The following table gives the average composition of the milks of all the cattle entered at the Dairy Show milking trials during the ten years ending in 1901 :¹—

Breeds.	Fat.	Solids other than Fat.
Shorthorns	3.82	9.10
Jerseys	5.29	9.31
Guernseys	4.71	9.14
Red Polled	3.62	9.02
Ayrshires	4.06	9.12
Kerries and Dexters	4.09	8.99

From these figures it would appear that the limit fixed by the Board of Agriculture is not unfairly high, more particularly when the two sets of analyses

¹ *Journal of the British Dairy Farmers' Association*, vol. xvi.

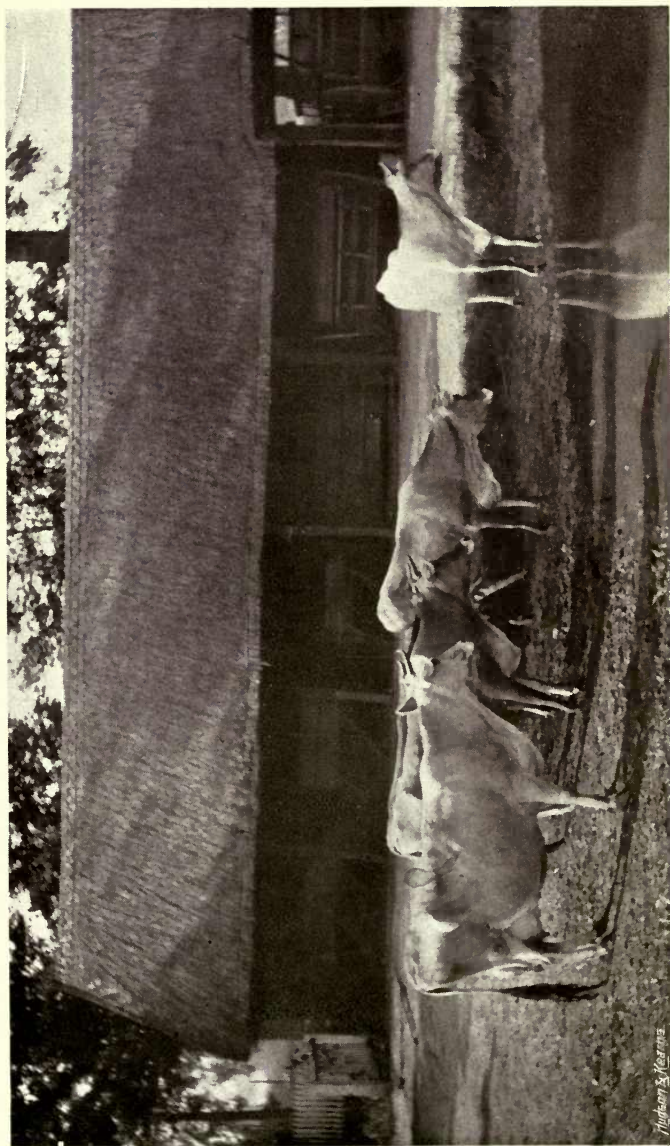
8 ECONOMIES IN DAIRY FARMING

given at the commencement of this chapter are taken into consideration.

It will be noticed that the Jerseys give the richest milk, and the question naturally suggests itself: Is this richness of milk peculiar to the breed, or has it been grafted into it, as it were, by careful selection in breeding of both sires and dams?

There is an old idea that the smaller the breed the better will be the milk, but the extraordinary richness of the milk of the Jersey cow is to be traced to the care and attention given to the breeding of the cattle by the Island farmers for now nearly a hundred years, and to the system of feeding their young stock, assisted in this respect no doubt by the climatic conditions of the Channel Islands.

Cows of other breeds occasionally yield milk as rich as the Jerseys, but in such cases the same peculiarities are found in them as are found in the Channel Island cattle. What these peculiarities are, will be considered in the next chapter.



AT THE DRINKING POND.

CHAPTER II

CHARACTERISTICS OF DAIRY CATTLE

THE United States Year-Book of the Department of Agriculture for 1901 contains an article by William M. Hays, on "Progress in Plant and Animal Breeding," which will well repay careful reading and study. In it occur the following passages, which, as they illustrate the methods of breeding pursued by the old breeders on this side of the Atlantic, need no apology for being inserted at length.

"Those who have earnestly and intelligently undertaken the improvement of any plant for a period of ten or twenty years, and have observed the vast improvement in animal breeding, are unanimous in their belief that 10 per cent. additional can be secured in twenty years by a further improvement through plant and animal breeding alone." . . . "Some experiment stations have demonstrated the vast difference in the ability of individual cows to produce milk products cheaply from a given amount of food. Some cows do not pay their board, others produce values equal to two or three times the cost of food." . . . "The breed of dairy cattle to be the most profitable must have, in addition to a large capacity to consume food and the quality to long sustain a large flow of rich milk, the ability to resist tuberculous and other

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diseases ; it must be prolific in calf-bearing ; longevity should be a strong characteristic ; the animals must have kind dispositions ; and all these must be blended as a strongly flowing stream in the heredity of the breed." . . . "Some families of Shorthorn cattle have been bred to the extreme standards of the fat animal prepared for the show ring. This has resulted in part because they have been in competition at shows with the special-purpose beef breeds until they have unfortunately lost nearly all their valuable milk-giving qualities, and no longer will serve the general farmer for a general-purpose breed of cattle, as do the families of so-called milking Shorthorns."

To illustrate these remarks we must go back at least one hundred years, and in the first place to the time of the celebrated agriculturist, Robert Bakewell, whose name will not be forgotten in England as long as the breeding of cattle and sheep is conducted on scientific principles. He not only did more to improve the breeds of cattle and sheep peculiar to his locality, but the success of his achievements caused others to follow his example. Bakewell was born at the Grange, Dishley, in Leicestershire, in 1726 ; his father, who died in 1773, aged eighty-eight years, being also an eminent agriculturist.¹

The breed of cattle with which his name will always be associated was the Longhorn, which even in his early days had "been greatly improved from the flat-

¹ *Journal of the Royal Agricultural Society of England*, vol. v. part i. 1894.

CHARACTERISTICS OF CATTLE 11

sided, coarse-shouldered, old Longhorn of Ireland, and the western side of England."

Bakewell's cattle are described as "round, tight, cylindrical carcase; wide in the hips, but very little prominence in the huckle-bones; straight back, well filled behind shoulders; neck long and fine, without any superfluous skin or dewlap; horns long, taper downwards, and of a deep yellowish colour; head fine and smooth. The barrel form, gradually tapering towards the ends, was the model as in sheep."¹ From the foregoing, as well as from reports of other breeders who saw the Dishley cattle, it is clear that the herd was not a dairy one. George Culley, who with his brother Matthew Culley visited Dishley in 1762, is said to have "declared that the Dishley cows were invariably bad milkers," although Bakewell appears to have tried to conceal this imperfection.²

George Colling, one of the celebrated brothers Colling, who are "generally regarded as having done the most to improve, and to show how to improve, the cattle of the United Kingdom,"³ and whose names are still associated as the pioneers in Shorthorn breeding, visited Dishley in 1782, twenty years after Culley had been there, and found that Bakewell was "engaged in improving his cattle by developing enormous masses of fat over the hip bones and at the end of the hind-quarters."⁴

These quotations show that, with Bakewell, milk

¹ *Journal of the Royal Agricultural Society of England*, vol. v. part i. 1894.

² *Ibid.*, vol. x. part i. 1899.

³ *Ibid.*, vol. x. part i. 1899.

⁴ *Ibid.*, vol. x. part i. 1899.

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was not considered so important as beef, and that the improvement he effected lay in altering the shape of the cattle with a view to their developing their propensity to fatten. Nor can this be a matter of surprise. The consumption of milk in enormous quantities is of very recent growth, and at that time the absence of quick transport was an insurmountable difficulty, while the demand for beef was comparatively larger than it is now, since the supplies from abroad, which we now depend upon, were not then obtainable.

Following in the wake of Bakewell, although they certainly studied the principles of breeding more thoroughly, and carried out their views systematically, came Robert and Charles Colling.

To them is rightly attributed the fame of being the first great improvers of the Shorthorn breed of cattle, effected by careful selection, attention to "quality," and "inbreeding," which they almost reduced to a science.¹

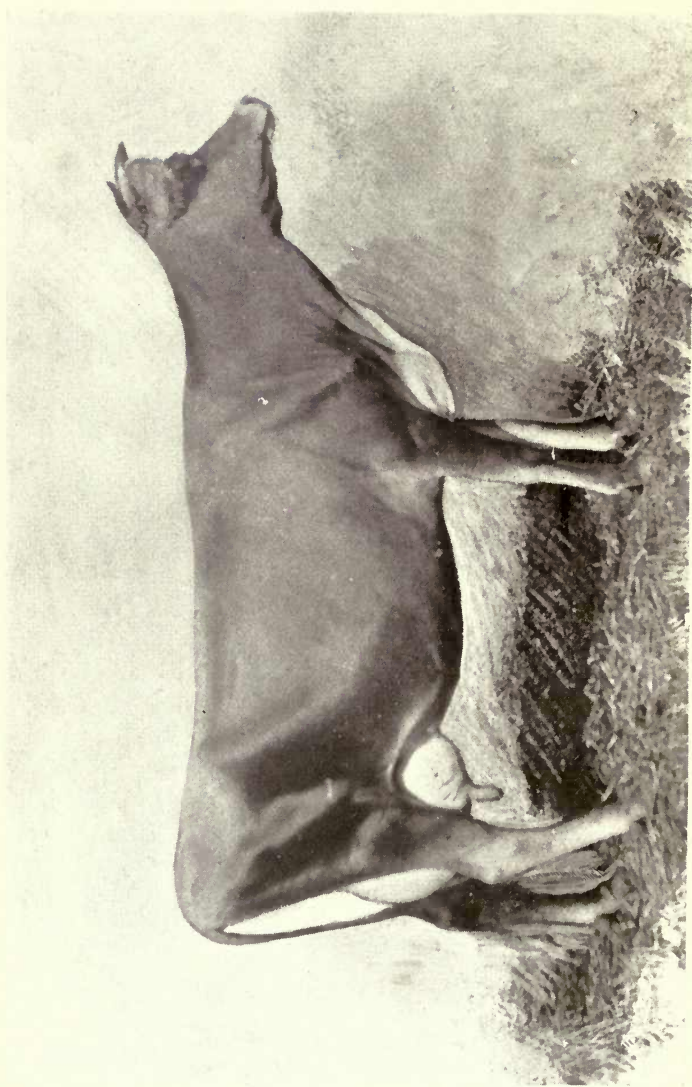
Unlike Bakewell, they looked out for good milking heifers, but as they preferred animals with a propensity to lay on flesh, they must be considered to have carried on his tradition, and made "beef" their ultimate aim.

While in England the improvement of cattle was being worked out with a view to the economical production of beef, on parts of the Continent and in the Island of Jersey a very different idea prevailed. In 1789 a law was passed by the States of Jersey prohibiting the importation of cattle from France.

¹ *Journal of the Royal Agricultural Society of England*, vol. x. part i. 1899.



LONG-HORNED COW.
(After D. Ward, R.A.)



A JERSEY COW.



CHARACTERISTICS OF CATTLE 13

At that time "the Island cattle were noted for the peculiar richness of their butter, and the Jersey farmer, conscious of possessing a breed so excellent for the production of rich milk and cream, was content to possess an ugly, ill-formed animal, with flat sides, provided that she had a well-formed and capacious udder, with large swelling milk-veins; the only question in the selection of a bull amongst the most judicious farmers being, 'Is the breed a good one?' meaning, had its progenitors been renowned for their milking and creaming qualities."¹

If the subsequent histories of the Shorthorns and Jerseys are followed from the times of the Collings up to the present, the one great point noticeable with regard to the opinions of the breeders of both types is, that the "prepotency" of the male animal was clearly recognised, and on this more than on the shape or characteristics of the female did they found their expectations of breeding the class of cow they required.

It must not be supposed, however, that the earlier breeders neglected the type of the cow altogether, although in the Shorthorn circles the dairy points were undoubtedly little considered. The Collings "looked out for good milking heifers," but their system of feeding would militate against their ever turning out profitable dairy cattle. The Jersey breeders, on the other hand, disregarding the beef points, as early as 1834 drew up a scale of points for judging both bulls and cows, which was revised

¹ *Journal of the Royal Agricultural Society of England*, vol. v. 1844.

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in 1849, 1851, and 1858. In 1850 the Island Society published a print of a cow with the parts of the animal to which the points applied specially figured out. In 1875 the last, and present, scale of points was drawn up, which is undoubtedly the model from which the scale of points for judging a dairy cow, regardless of breed, given in the Year-Book of the United States Department of Agriculture for 1900, has been taken.

The result of breeding on systematic lines is well exemplified in these two breeds, both starting from an origin so far common to both that they were both supposed to be milking breeds.

The photographs which are reproduced show distinctly the differences between the extremes of these two dairy breeds.

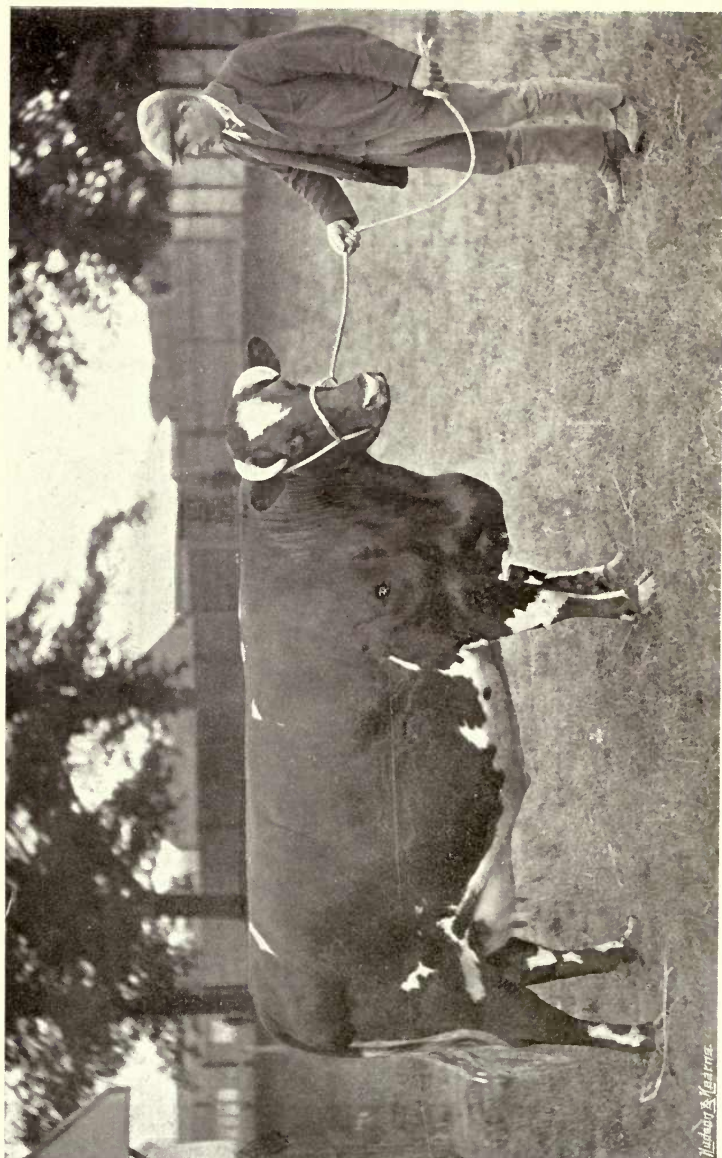
The histories of these old breeds of cattle, extending almost over a hundred years, afford a good illustration of the science of breeding, showing, as they do, how by care and intelligence animals may almost be "moulded" to any shape required, and also that the milking and fattening qualities of the respective kinds can be thoroughly controlled. They further demonstrate that the shape of the dairy cow differs from the beef animal, and that the ability to milk is equally transmissible as the aptitude to fatten.

THE CHARACTERISTICS OF A MILKING COW

What the farmer ought to know is how, independent of breed, to select a good milker from her



A BEEF COW.

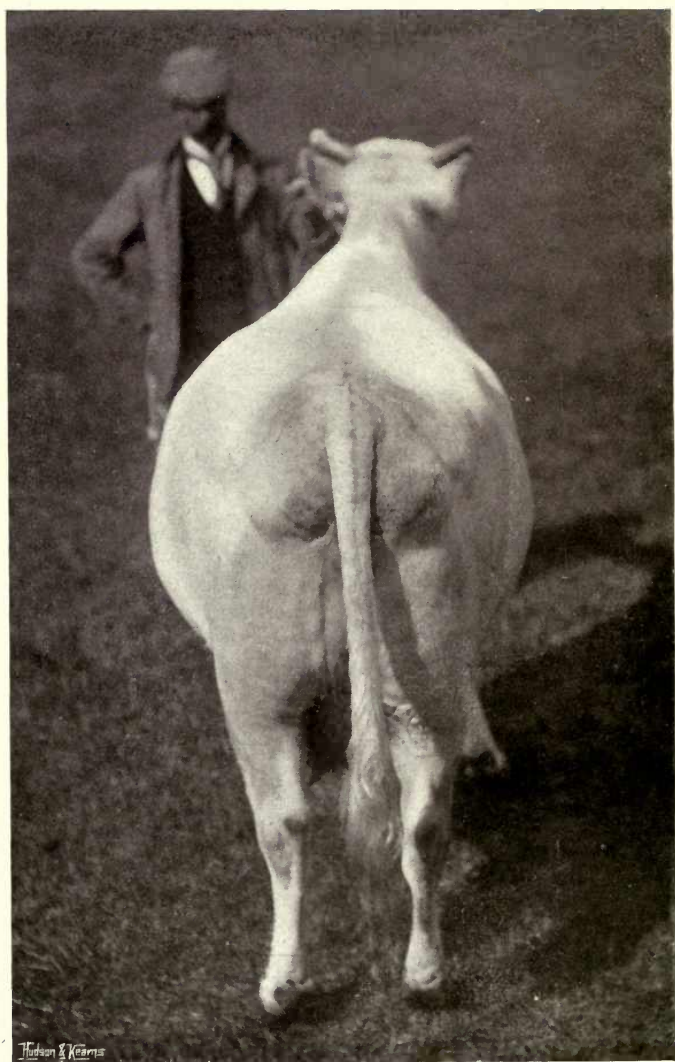


A BEEF COW.

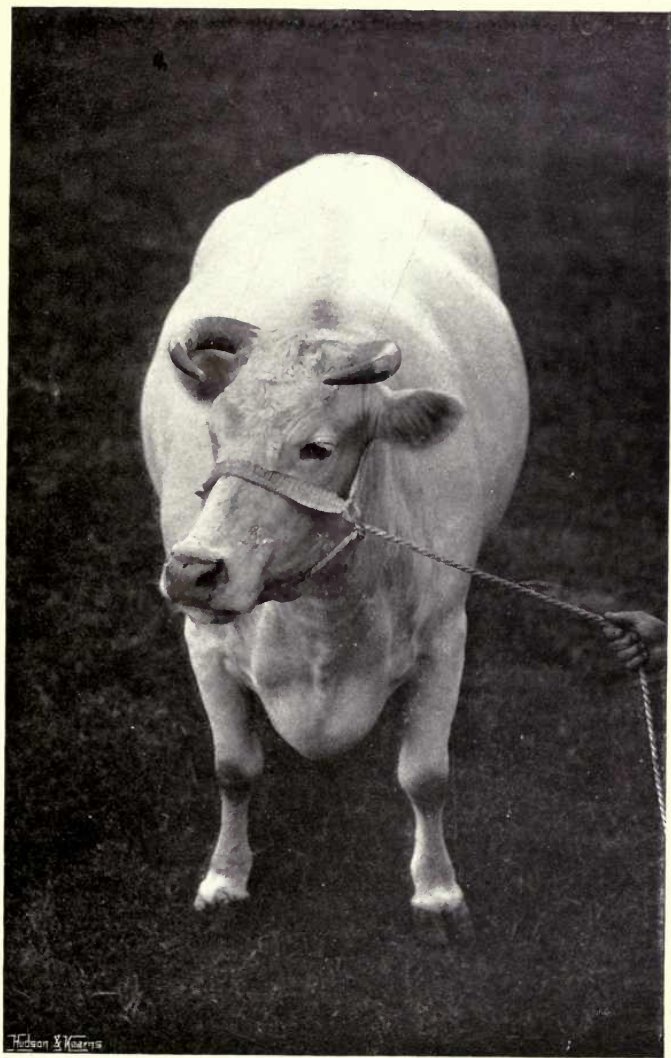
Richard S. Catron



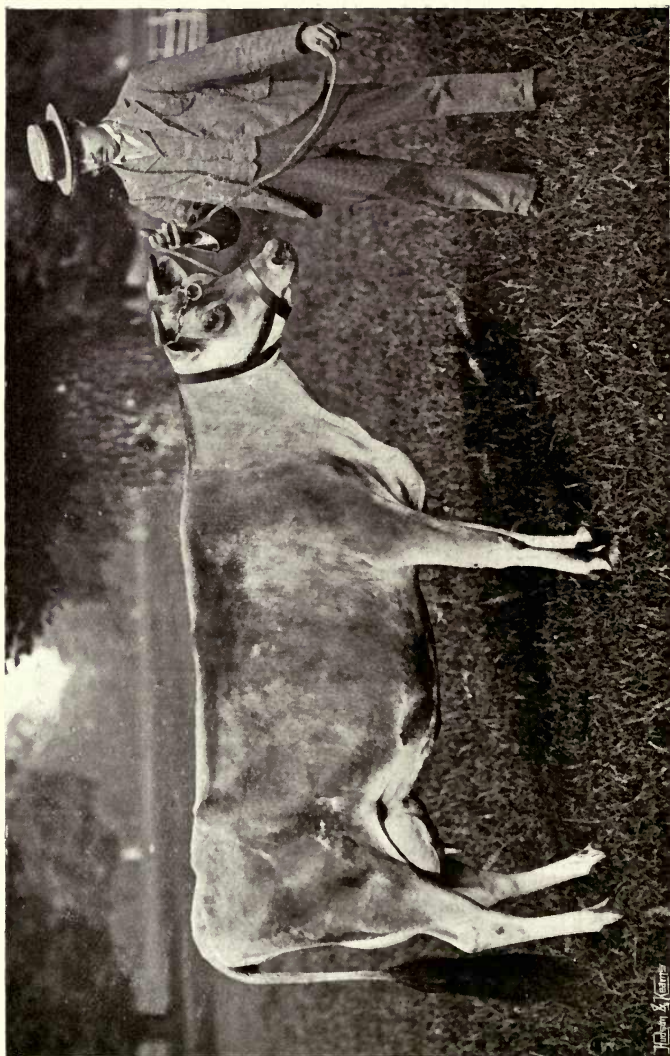
A BEEF COW.



A BEEF SHORTHORN.



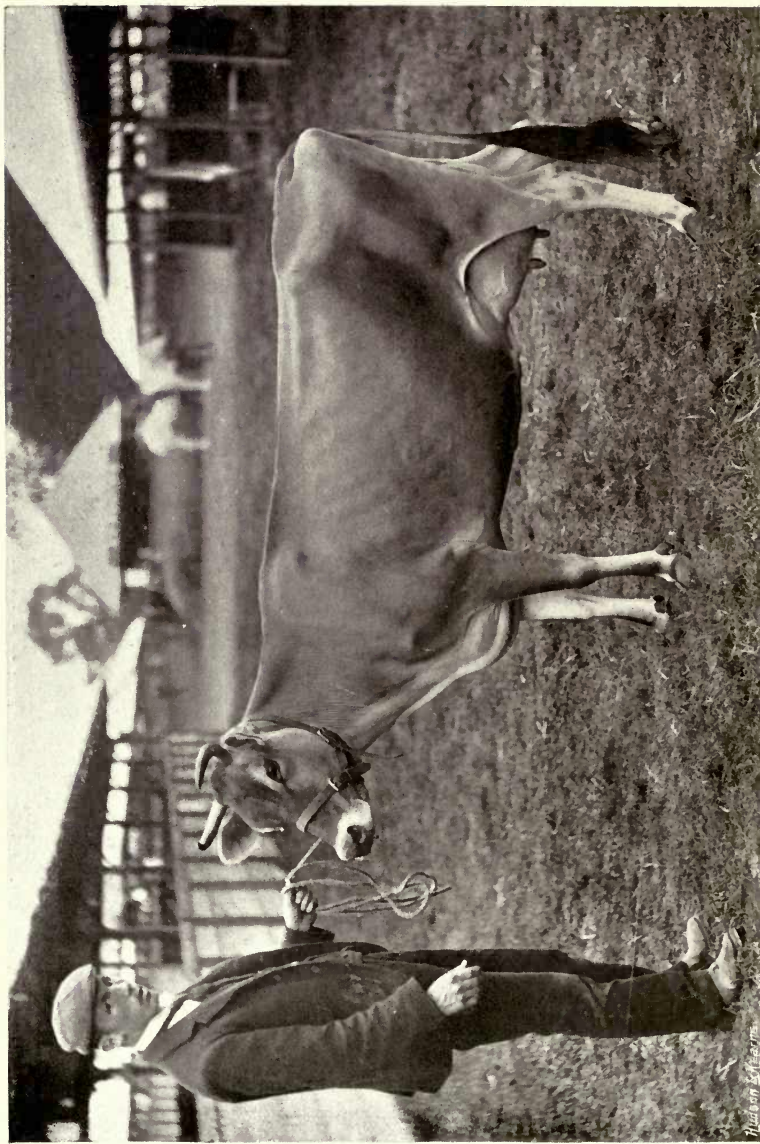
A BEEF SHORTHORN.



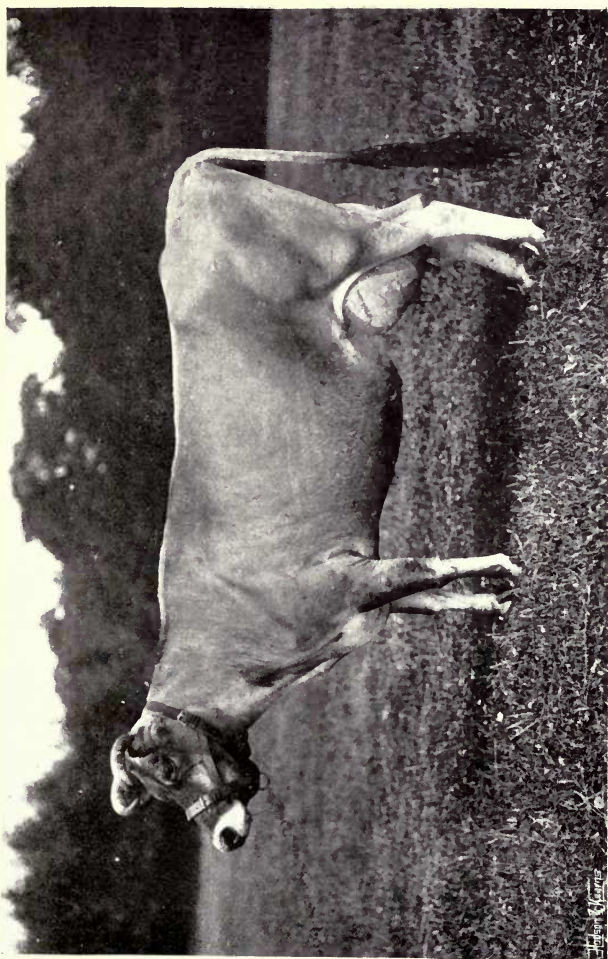
A DAIRY COW.



A DAIRY COW.



A DAIRY COW.



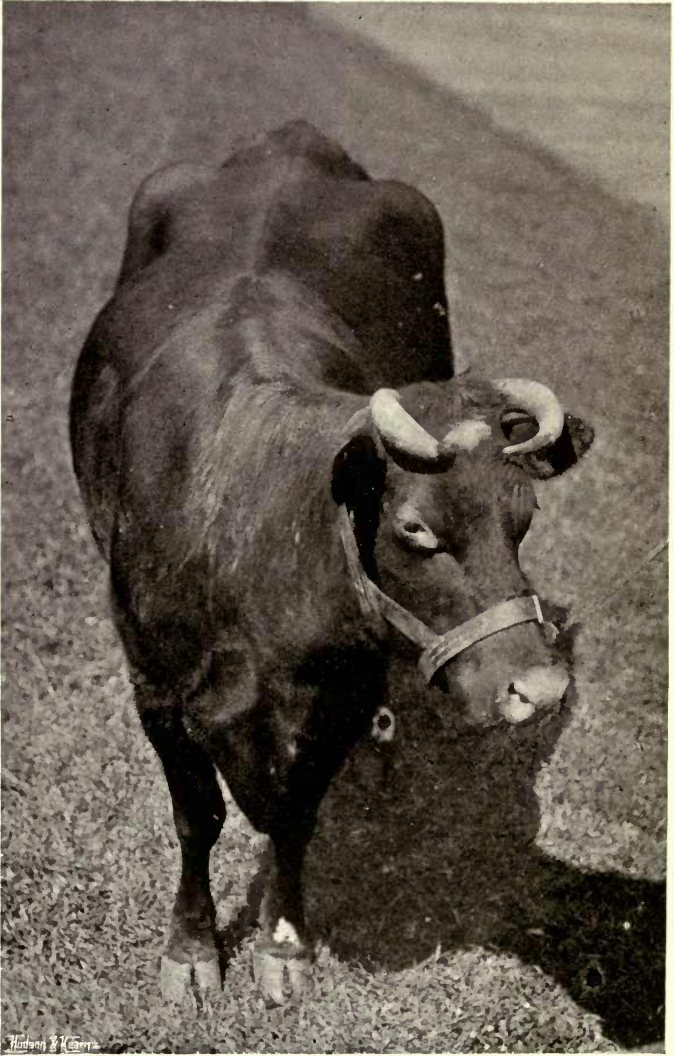
A DAIRY COW.



A MILKING SHORTHORN.



A MILKING SHORTHORN.



A DAIRY COW.

CHARACTERISTICS OF CATTLE 15

appearance and such external signs as appeal to the eye and sense of touch.

And first, the shape of a milking cow differs from that of the fattening animal in the same way as a wedge differs from a block. The following examples will illustrate this difference clearly.

Shape.—The points of a dairy cow, so far as they relate to shape and make, may be condensed as follows:—

She should be like a wedge in shape when looked at from behind, tapering on the top as well as on the side towards the neck. Her head and neck should be fine and clean, the dewlap, if any, being thin, and her horns small. Her shoulders should be light and oblique, with high withers, free from flesh, her back lean and open-jointed. Hips wide apart, rump long and wide, with fine tail, well set on, and reaching down to her hocks. Thighs long and lean, flank thin and not fat. The udder should be full behind, extending well forward and not fleshy, with teats evenly placed and of good size, while the milk veins should be large and easily traced along her stomach.

The dairy cow differs, however, in other particulars from the beef animal, and notably in the feel of her skin. To estimate the value of a cow, whether for milk or butter production, she should be “handled,” but not as if she were being judged for a fat stock prize. To “handle” a dairy cow properly, one must feel the skin behind the last rib at a point about half-way between the hip bone and the flank, rubbing it gently backwards and forwards between the finger and thumb, when the touch can be easily appreciated.

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If the skin is thick and mellow, the cow is not suitable for the dairy, as her milk will be of poor quality, the tendency of such an animal being to put on flesh.

If thin and wiry, other conditions—such as shape—being favourable, she will give a good quantity of milk, but of poor quality ; she will also be an unprofitable cow to fatten.

If thin and mellow, she will yield milk of good quality, and will probably put on flesh when dry.

A dairy cow with a thick, wiry skin is not worth buying.

It is very commonly thought that feeding will alter the quality of the milk, as it will temporarily alter the touch of the animal. The question of feeding will be considered in the next chapter ; but my experience (gained by examining over a thousand cows that have been tested by me for milk and butter) is that no feeding will make the skin thin if it is naturally a thick one. A thick skin and a wiry skin may both be temporarily improved by foods rich in oil, but the quality of the milk will not be permanently affected by the temporary mellowing of the skin.

The touch of the udder corresponds with the touch of the skin. A cow with a thin mellow skin will have an udder with a loose, thin covering, like in feel to a kid glove, which can be pulled away from the fleshy membrane. On the other hand a cow with a thick hide, whether it be mellow or not, will invariably have a thick, fleshy udder. A cow with a thin, wiry skin

CHARACTERISTICS OF CATTLE 17

will have an udder with a wiry touch, although not necessarily fleshy ; but it will be covered with coarse, wiry hair, which is not usually found with rich milkers.

The hair on the udder should be fine and silky, the presence of dandruff being a good sign.

In comparing the relative merits of dairy cattle by touch, it is important to handle each animal in the same place, as the hide gets thicker as it approaches the shoulder, so that to handle one cow close behind the shoulder, another above the ribs, and a third above the flank, is not fair to the animals whose respective merits are being compared.

The Udder.—The udder should hang almost perpendicularly behind, and should extend in a straight line along the stomach, parallel with the back, the front quarters being well developed. The teats should be wide apart, and placed evenly on both sides.

Badly shaped udders detract from the appearance, and also from the value of a cow, although it does not necessarily follow she will milk poorly, as the best-shaped udders may be spoilt by carelessness and bad milking.

The shape of the udder is a matter of breeding. This is well illustrated by the excellence of the udders of the pedigree, as compared with those of the unregistered cattle in the Island of Jersey, where the greatest care is taken to see that all the pedigree sires are from cows with good-shaped udders, for which reason bulls have to be shown with their dams before

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they can be entered in the Herd Book. The size, however, of the udder must not always be taken as an indication of what the yield of milk will be. A calf that has been too long fed on new milk will develop an udder of abnormal size, although on coming to maturity she will yield less than an animal with a smaller and less fleshy one. To judge a cow, therefore, from the size of her udder alone may frequently lead to error.

The four photographs which are reproduced illustrate the differences between good and inferior shaped udders, even where the cattle, as in the present instances, are good milkers.

The milk veins should be prominent, and the same on both sides of the stomach; the appearance of small veins on the udder itself being always considered a good sign.

It is worthy of note that the period of lactation—that is, the length of time during which a cow will milk—corresponds closely with her touch. Thick, mellow-skinned cows will not usually milk as long as those with thinner skins; the food in such cases going to the putting on of flesh, to the detriment of both the quantity and quality of the milk. Thin-skinned animals, whether they be wiry or mellow, not being predisposed to fatten, are not so easily overfed, and so milk for a longer period, the food going in the first place to making milk.

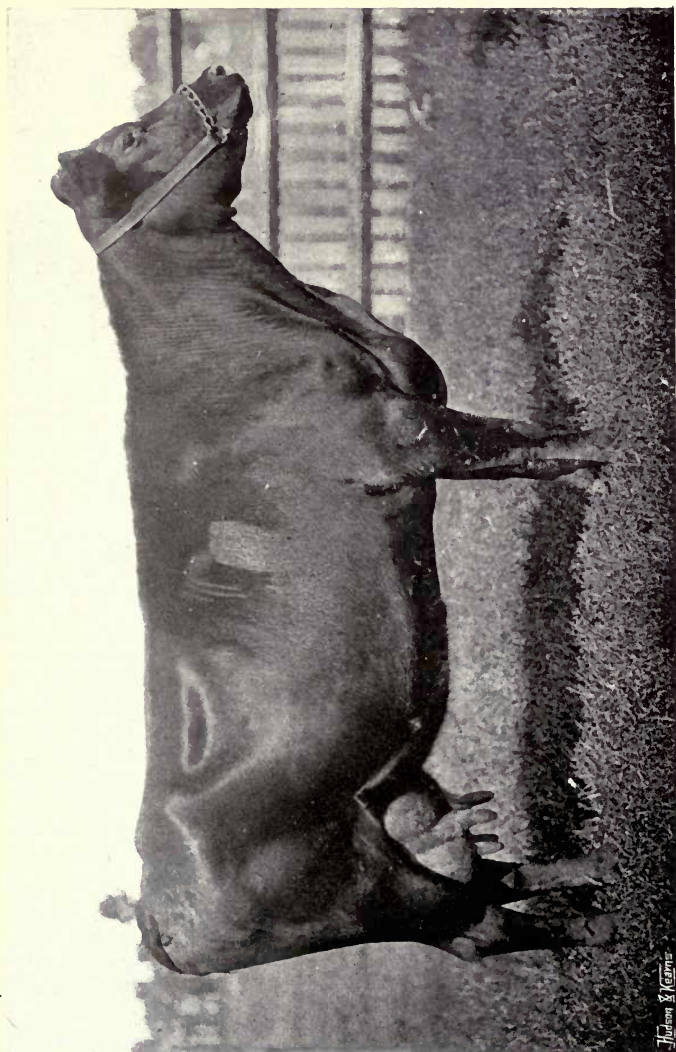
The Escutcheon.—The escutcheon, or milk mirror, is found on the udder and thighs. It is formed by hair growing on the udder and thighs in a contrary direc-



A FAIRLY GOOD UDDER.

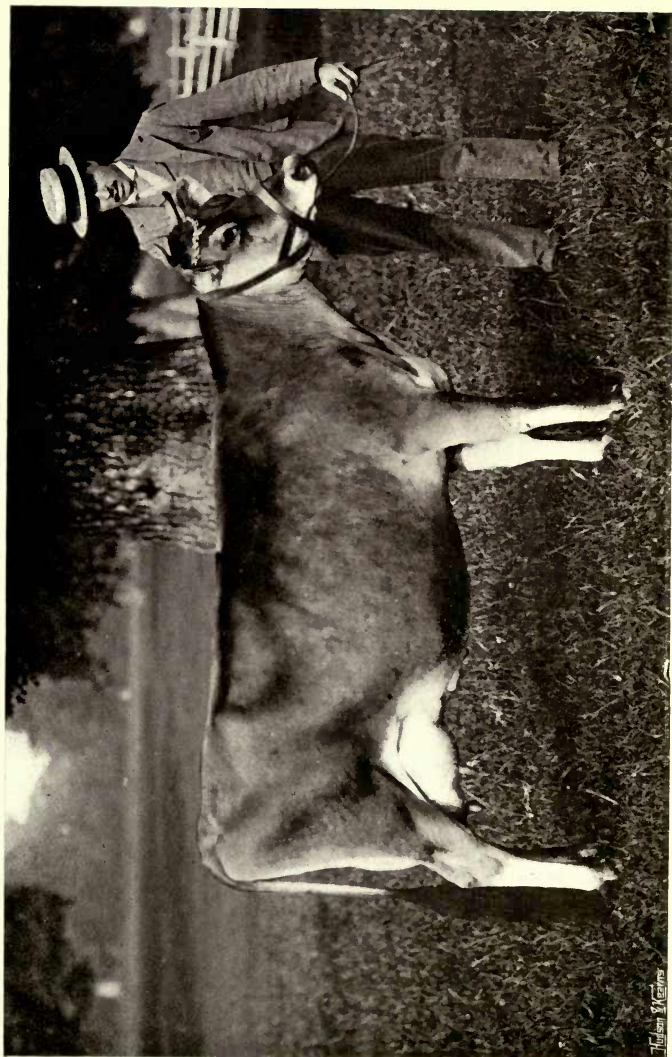


A GOOD DAIRY SHORTHORN UDDER.



A FAULTY UDDER.

Hudson & Co.



AN EXCELLENT UDDER.

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tion to the surrounding hair. It is found on all horned stock, but on some is more distinctly seen than on others.

The first to call attention to it was a Frenchman named François Guenon. He was the son of a gardener, and was born about the beginning of the last century.¹ Like many a cottager's child in this country, one of his early tasks was to tend his father's cow, and while doing so, cleaning and scratching her—she being a pet and a good milker—he noticed that dandruff fell in considerable quantities from certain parts of the udder and thighs where the hair growing in opposite directions met.

This led him to examine the neighbours' cows, and, after several years of long and patient observation, he was able to systematise his theory of the escutcheon. He claimed to be able to tell, from an examination of the escutcheon, how much milk a cow would give and the length of time she ought to remain in milk. Presumably, however, that was with a particular breed of cows, whose average yield of milk he would know. Without going so far as this, there is no doubt that the escutcheon, when well developed, is a sign that the cow will yield the maximum of milk of her particular breed; while an escutcheon of the same order, but with faults in it, will denote an animal of inferior milking capacity.

To return to Guenon. He gave a public test of the value of his theory before the Academy of Bordeaux

¹ "How to Select Cows on the Guenon System," by Hazard, published by J. M. Stoddart & Co., Philadelphia, 1879.

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in 1827, and also before the Agricultural Society of Aurillac in 1837, the results of which trials were so surprising that the former society gave him their gold medal, and distributed 1000 copies of their full report among all the agricultural societies of France.

He was eventually granted a pension of 3000 francs a year by the French Government, after giving a remarkable proof of the value of his theory, by gauging the worth of a lot of cattle in the presence of fifty of the most eminent agriculturists, his estimates being correct, in all but one, of the quantity of milk; in all but one, of the period of lactation; and again, in all but one, of the quality of the milk.

His system has since that date been further tried, a commission to investigate and test the "Guenon milk escutcheon theory" having been appointed by the Commonwealth of Philadelphia in 1878, which, after having examined 200 cows, published their report as follows:—

The Pennsylvania Guenon Commission . . . , report that "they have examined 200 cows, heifers, and bulls, and the result of their examinations has been to convince themselves and others of the merits of the system, of its exceeding value to the practical farmer; and they believe that if generally followed for twenty years, the value of the neat cattle of the State would be increased vastly, the amount of milk and butter produced would be much larger, and the quality of both articles better, while the quality of the meat would be improved." . . . "As an adjunct to previous knowledge to assist purchasers or breeders

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of cattle in getting or raising the best, and weeding out the poorest, they think it is worthy of being acquired by every farmer." . . . "Any intelligent man can readily master the system, and soon become proficient in it by practice. This knowledge, applied with the tests heretofore usually used, will enable any one to become a good judge of cattle."¹

The escutcheon, to put it shortly, is an indication of what a cow should yield, and its value consists in the fact that from it the dairy properties of an animal may be forecast while it is still a calf. This value, nevertheless, can be seriously affected, if not altogether destroyed, by bad management. A heifer with the very best escutcheon, can be ruined as a milker by being overfed when young. This will explain why in some cases a bad dairy cow may be found with a good escutcheon, which, but for such explanation, might throw doubt on the theory.

As was said before, the escutcheon is formed by the different way the upward and downward hair grows on the udder and thighs. The photograph of the first cow given on page facing 22 shows the form of the escutcheon very distinctly; but it must not be accepted as a specimen of the best of its order, it being inserted because the animal having a coarse coat, the escutcheon can be easily made out.

It is not always easy to see the escutcheon when a cow has a very fine skin, or in the summer months when the coat is at its best, but it can always be felt by passing the hand over it, as the upward growth of

¹ *Report of the Pennsylvania Guenon Commission, 1878.*

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hair which forms the escutcheon can easily be distinguished from the descending hairs.

In the photograph opposite it will be noticed that the escutcheon projects two ways: (*a*) on to the thigh, and (*b*) up the back of the udder. Although the escutcheon is one figure, for the sake of clearness I have divided it into two parts, calling the marks on the thighs the horizontal escutcheon, and the marks going up the back of the udder the vertical escutcheon.

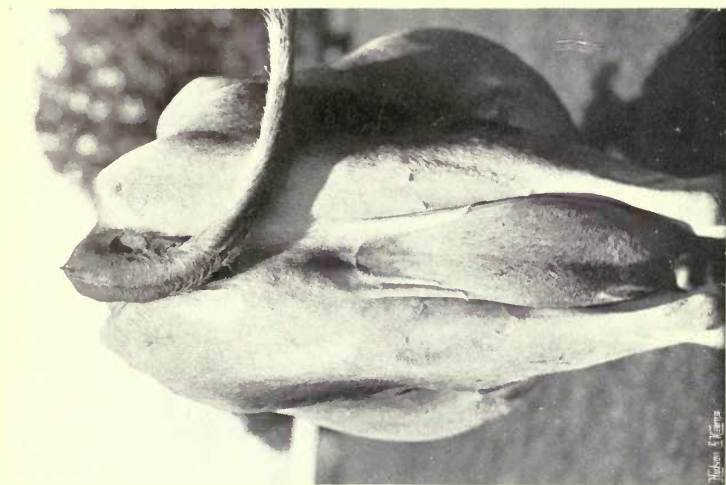
The escutcheon markings on the thighs are easily learnt, but those which go up the back of the udder, which are more difficult to appreciate, have given the names and classifications to the different orders which Guenon framed.

The Thigh Escutcheon.—In judging the value of this escutcheon, it must be noted that (1) the higher up, and the wider on the thigh the markings extend, the better it is; (2) the escutcheon on both sides should be symmetrical.

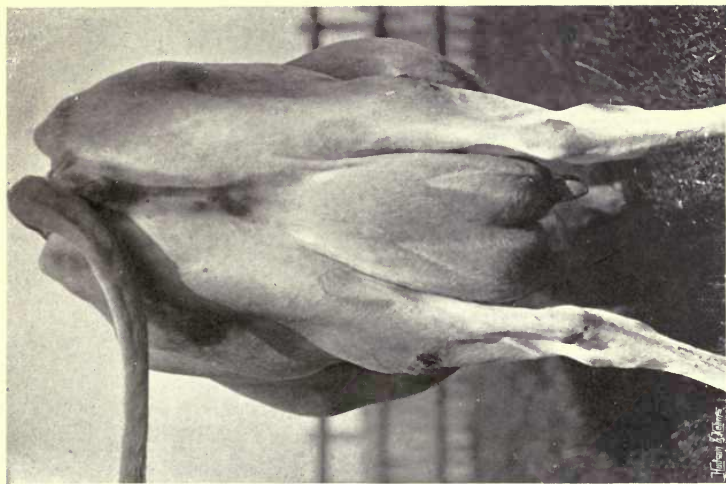
The general rules drawn from the horizontal escutcheon are as follows:—The higher up on the thighs the markings extend, the longer will the cow remain in milk.

The wider the markings on the thighs, the larger will be the yield of milk. These two points should be thoroughly grasped.

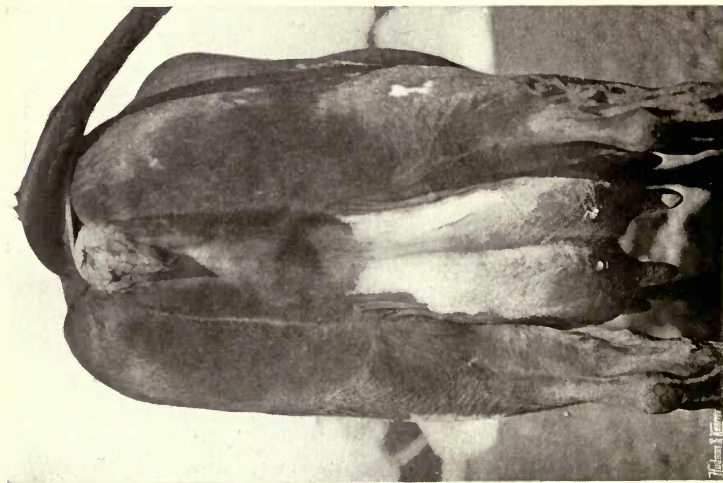
The lower down the markings of the horizontal escutcheon are on the thigh, and the narrower they are in width, the shorter will be the period of lactation, and the smaller the yield of milk.



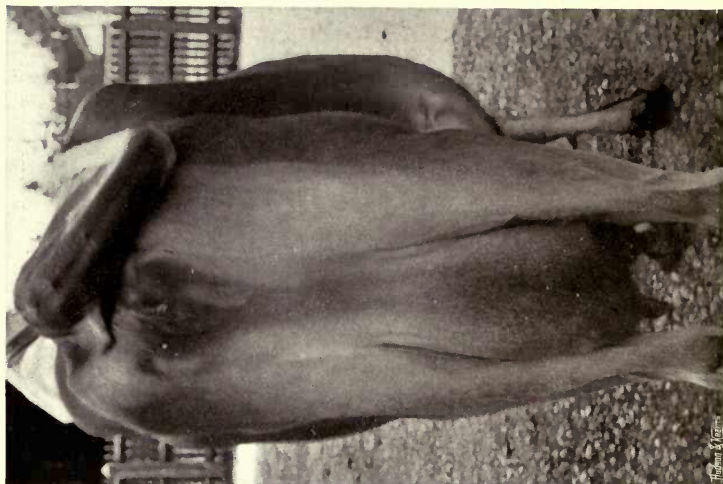
A CURVELINE ESCUTCHEON.



A SELF-AGE ESCUTCHEON.



*A FLANDRINE ESCUTCHEON
(SHORTHORN).*



*A FLANDRINE ESCUTCHEON
(JERSEY).*

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The accompanying drawing shows the shape of a good thigh escutcheon, to understand which, it must be assumed that the skin of the udder and thighs are laid out straight.

The Vertical Escutcheon.—The vertical escutcheon, as was said above, is that part of the escutcheon which runs up the back of the udder. It varies in shape and appearance, and from these different forms Guenon classified his different orders.

The value of the vertical escutcheon seems to lie in the fact that it explains why the quantity of milk is, in certain cases, not so much as it ought to be, if only the horizontal marks were taken into account. To illustrate this, the horizontal escutcheon taken by itself may foretell a large and prolonged flow of milk, but a mark in the vertical part may show that the milk will fall off directly the cow gets into calf.

Classification of Escutcheons.—Guenon divided the escutcheons into different classes, all of which were based on the shapes of the vertical markings, and these classes were again sub-divided into orders, the perfect escutcheon of each class being called the first order.

It will be sufficient here to give an example of the best escutcheon of each class, bearing in mind that, as the vertical and horizontal markings are less developed, so the value of the animal as a milking machine is depreciated.¹

¹ For fuller information on these different classes, the reader is referred to "How to Select Cows on the Guenon System," by Hazard, published by J. M. Stoddart & Co., Philadelphia, 1879.

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The vertical escutcheon markings are divided into ten classes, which are as follows :—

(1) *The Flandrine*.—This is a broad band of ascending hair, running from the top of the horizontal escutcheon right up the back of the udder to the vulva. The thigh markings in this class are very rarely broad. The dividing line between the ascending and descending hair should not be marked by coarse hairs, this being a bad sign.

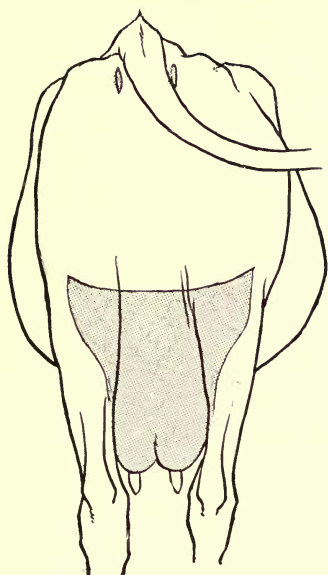
If the band is broken off short, or narrowed and encroached upon by patches of descending hair, the escutcheon will come into one of the inferior orders of this class, and the animal will correspondingly be found to be an inferior milker.

These remarks apply equally to every class, and show that care is necessary to classify correctly all the various markings (Guenon's ten classes being divided into four orders, making a total of at least forty different markings).

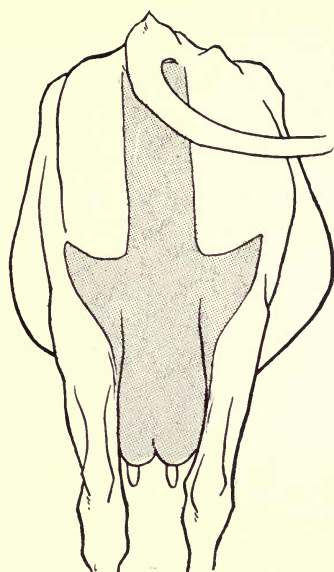
Two photographs of Flandrine escutcheons are given facing pages 22 and 23, in addition to the drawing, for the purpose of criticism, so that the reader may be able equally to find fault with escutcheons of any of the other classes when comparing with the drawing they represent.

The photographs are of two cows, both of which were good dairy animals, one being a dairy Shorthorn, the other a Jersey.

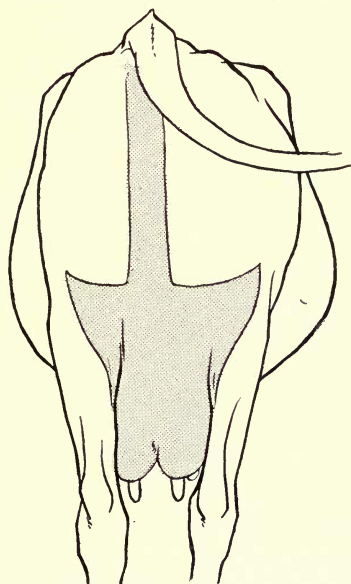
It will be observed that on neither of the cows do the thigh or horizontal markings appear well developed, the Shorthorn being the better of the



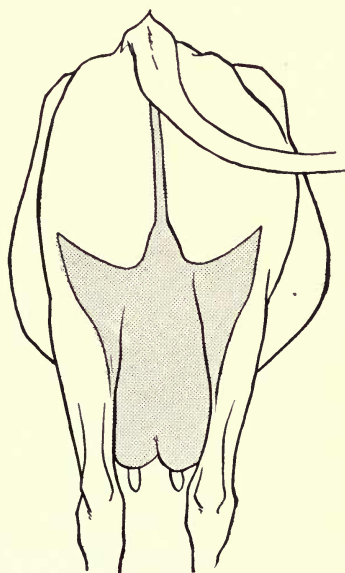
THE THIGH OR HORIZONTAL.



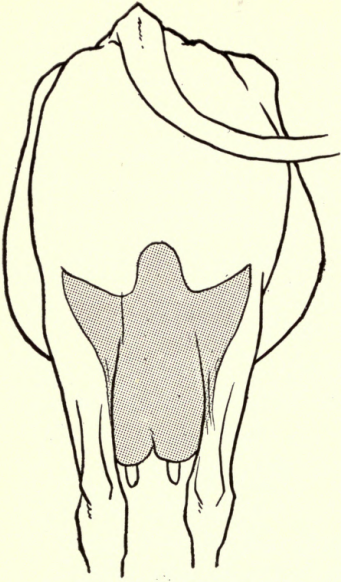
THE FLANDRINE.



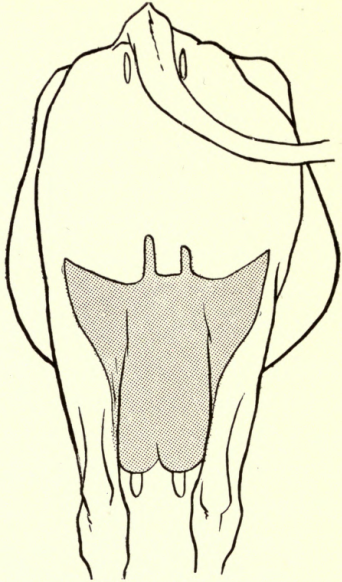
THE LEFT FLANDRINE.



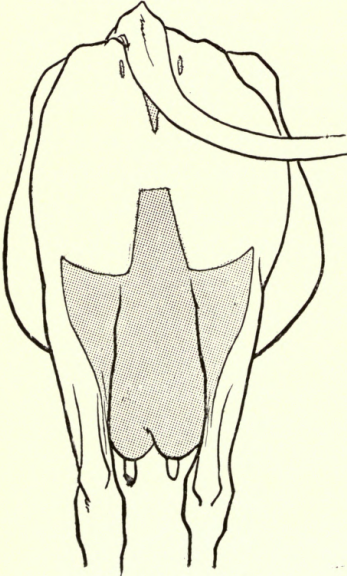
THE SELVAGE.



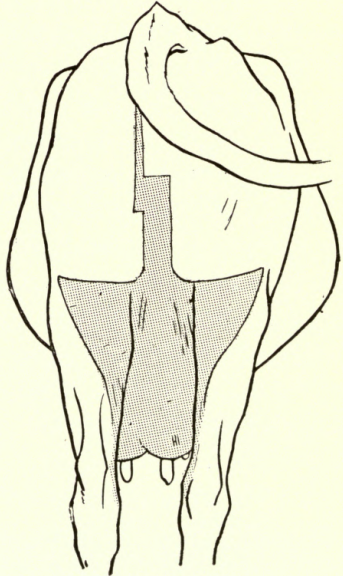
THE CURVELINE.



THE BICORN.



THE DEMIJOHN.



THE SQUARE.

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two, although the outlines are not symmetrical. On the vertical escutcheon, the presence of coarse, wiry hairs will be noticed on the dividing line between the ascending and descending hairs in the case of the Shorthorn, while in the Jersey they are absent. On the other hand, the broad vertical band of ascending hair in the Shorthorn has no break in it, but in the Jersey a small patch of descending hair is apparently present, which detracts from the value of the escutcheon.

If the performances of these two cows could be traced, it would most probably be found that neither of them held up the flow of milk as well as the cow whose portrait is given opposite page 22, where the thigh markings are much broader and better developed.

(2) *The left Flandrine*.—A band similar to the last, but only half the width, and running up the left side of the udder.

(3) *The Selvage*.—A narrower band, which, starting fairly broad from the horizontal escutcheon, narrows as it goes up the back of the udder. In all these three classes, and in that of the double selvage mentioned below, the vertical marks should reach up to the vulva.

(4) *The Curveline*.—A curved figure rising from the horizontal escutcheon, and running a short distance up the back of the udder.

(5) *The Bicorn*.—This is in form rather like a double Selvage (the next escutcheon to be represented), only that the narrow bands are cut off in the middle, and afterwards appear again in the form of two tufts on

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either side of the vulva. It is called the bicorn from the shorter markings taking the form of two horns.

(6) *The Double Selvage*.—This is an extension of the Bicorn, only that the horns are not divided, but continue up the whole length of the perinæum, and the space between the horns encroaches on the horizontal escutcheon. This is not often met with.

(7) *The Demijohn*.—This is rather like a Curveline and Selvage, the vertical markings, however, only extending a short way up the back of the udder, and being then cut off square. It has similar tufts to the Bicorn.

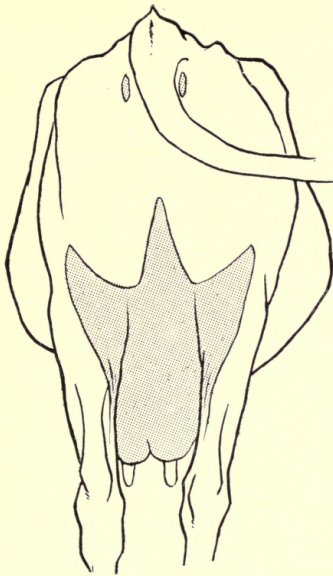
(8) *The Square Escutcheon*.—Like the Demijohn, only that a narrow band of ascending hair goes off from the top of the escutcheon to the left.

(9) *The Limousine*.—This is like an isosceles triangle running up from the Horizontal Escutcheon, and has the same tufts as the Bicorn.

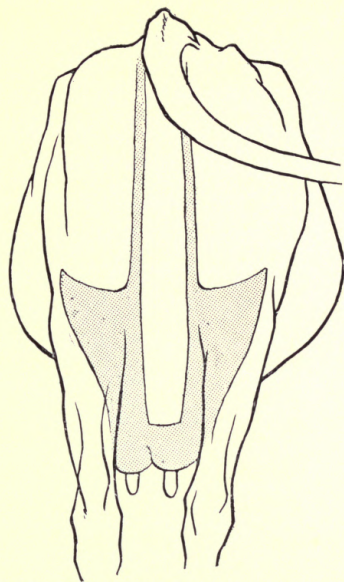
(10) *The Horizontal Escutcheon*.—This is simply a Thigh Escutcheon, as shown opposite page 24, without any vertical markings. The tufts are similar to those in the Bicorn.

In all the drawings given with the different escutcheons only the perfect development of each order is supposed to be shown; and as the descending hair encroaches on the ascending hair, reducing and otherwise disfiguring the symmetry, so the value of the escutcheon of the particular order will be diminished.

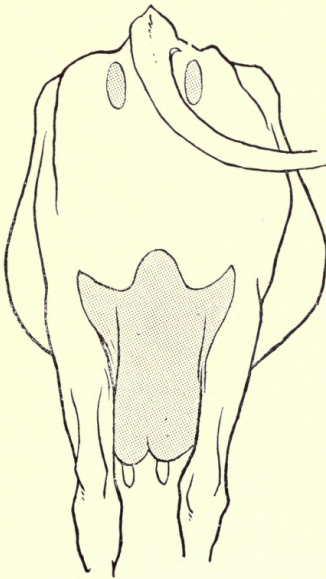
Of the ten orders, those most commonly seen are the Flandrine, Left Flandrine, Selvage, Curveline,



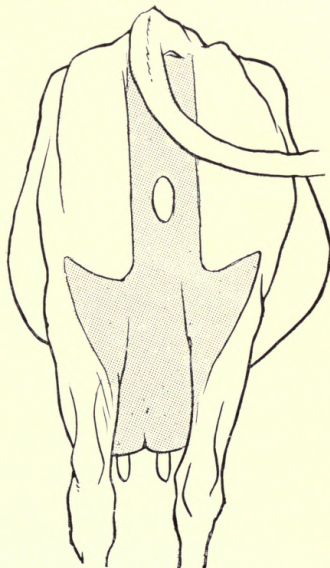
THE LIMOUSINE.



THE DOUBLE SELVAGE.



ISCHIATIC TUFTS.



PERINÆAL TUFT,



RETIRING FOR THE NIGHT.

Thompson & Keatinge

CHARACTERISTICS OF CATTLE 27

Limousine, and the Bicorn; but the other four orders should not be passed over, as otherwise good animals may be overlooked.

TUFTS AND OVALS

Apart from the shape of the escutcheon, there are other peculiarities which add to or detract from the value of the various escutcheons, which were called by Guenon Tufts and Ovals.

These, as their name implies, are tufts of hair and ovals of hair, which, sometimes on and sometimes off the escutcheon, must be thoroughly learnt, as a mistake in them may be productive of great disappointment to the ignorant buyer.

The two good tufts are as follows :—

(1) *The Oval Tufts*.—These are two ovals of descending hair on the back of the udder, on that part of it covered by the horizontal markings. They are only found on the best cows. The hair in the ovals should be fine. See selvage escutcheon opposite page 22.

(2) *The Mesian Tuft*.—This is a tuft of ascending hair, in shape like a V, which hangs down beneath the vulva. It is one of the best marks, and is usually found on cows with the Curveline, Bicorn, Limousine, and Demijohn types. It must not be mistaken for a similar-shaped tuft of descending hair, which is described later, and is a bad mark in a Flandrine.

The bad tufts are five in number :—

(3) *The Lip-Shaped Tuft*.—This is a line of descend-

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ing hair which hangs over and down the vulva on both sides. It is only seen in the Flandrine and Left Flandrine orders.

(4) *The Vulvan Tuft*.—This is exactly contrary to the Mesian Tuft described above, the hair growing in a downward direction.

(5) *Ischiatic Tufts*.—These are large round or oval tufts of descending hair on each, or sometimes only on one, side of the vulva, and must not be confounded with the small tufts that form part of the Bicorn, Demijohn, Limousine, and Square orders. These bad tufts are generally found in those orders where the vertical markings do not reach the vulva.

(6) *The Perinæal Tuft*.—This is an oval of descending hair, which is found on the vertical markings of the Flandrine order.

The "Ischiatic" and "Perinæal" tufts are found only in the worst cows, and are called by Guenon "Batards," or bastards. These markings are easily seen, and are discernible when the animals are quite young, so that it is an easy matter to draft them from the herd. Both of these blemishes indicate the same faults, viz., that although the cattle having them may give promise of being good milkers, they will fall off in their milk yield directly they get into calf. The "Perinæal" tuft is only seen in cows with Flandrine escutcheons, and the Ischiatic tufts in all the other classes.

(7) *Thigh Tufts*.—These are simple encroachments of descending hair on the horizontal part of the escutcheon, which, by diminishing the escutcheon in

CHARACTERISTICS OF CATTLE 29

width, detract from the milking properties of the animal.

I have gone very fully into these different markings, and have used the same terms that Mr. Hazard has used in his book on the subject, preferring them to the French names given to them by Guenon.

It may occur to my readers that the knowledge gained from mastering the escutcheon theory is not at all commensurate with the labour spent in acquiring it, as there are so many different orders, classes, and other marks, that the liabilities of making mistakes are many. If the difference between the horizontal and vertical markings is first clearly understood, and then the different classes are learnt, the various tufts, ovals, and imperfections will soon be appreciated, as they will force themselves on the notice of the beginner who is trying to classify the escutcheon. If the reader will only take this book in his hand, and try and find out the class and order to which any particular cow he may be looking at belongs, he will soon find the other marks described.

The ability to see the escutcheon at a glance is of great value when buying dairy stock, as the expert will look out for bad markings almost before he considers anything else.

The knowledge of escutcheons, too, is most useful to the breeder, as he will be able to draft out those calves which have bad markings, and to reserve for the herd those which promise to be good dairy cows.

At the risk of repetition, it cannot be too strongly

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impressed upon the student that the escutcheon is only a sign of what a cow should be able to yield; because the animal, with the best escutcheon possible, may have all its milking qualities destroyed by being overfed when a calf, as my experience is that this will spoil the most promising dairy animal.

Escutcheons are also seen on bulls, the Horizontal, Curveline, and Limousine being those most usually found.

The thigh markings on a bull should be a *sine qua non*, and it is important to see that they are even and well developed; while the more pronounced the vertical escutcheon the better.

A bull descended from a good milking dam will generally have a better escutcheon than one from a moderate cow, showing that the milking qualities are transmitted through the male animal.

One other proof of the value of the escutcheon is within the grasp of any breeder if he will be honest to himself.

Let him take the milk records of several of his cows for a year, and then go into his cowsheds and compare the yields and length of time the cows have been respectively in milk with the escutcheon markings, and he will find that the best cows have the best escutcheons, and that the various markings are good indications of the milk yielded.

If he at the same time examine the markings on his heifers—provided of course that they have been brought up for the herd and not been overfed—and makes notes of the same, he will, I think, not be dis-

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appointed with the theory when those heifers subsequently come into the milking herd.

The economy of breeding and keeping good dairy cattle is obvious. One example will make this clear. The difference in value between the milks of two cows giving respectively 500 and 700 gallons of milk, worked out at 8d. per gallon, leaves a sum of £6, 13s. 4d. in favour of the heavier milker. Assuming the food in each case to be the same, as on most farms it would be, it will be seen that the loss is even more than the difference shown.

To improve milking stock should be the object of the dairy farmer, but this can only be done by observing some such rules as follows :—

Only keep the best cows, and use bulls descended from the best milking dams.

Select the calves with the best escutcheons, and do not overfeed them.

Weigh all the milk and record the same against each cow, and, where butter is made, test the value of each cow for butter-making by the churn.

Do not discard heifers with their first calf because they do not milk as well as some of the cows, as frequently those heifers that yield too well with their first calves, turn out weak in constitution.

Never exhibit any heifer intended to be kept for the dairy in the inspection classes at any agricultural show, as she will be overfed and spoilt to a certainty.

If rules such as these were adopted by breeders of dairy stock, and the idea of breeding general-purpose cows given up, it would, I believe, be quite

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possible to largely increase the milk and butter yields of our dairy cattle, no matter what breed they belonged to. The great difficulty that almost impedes the in-breeding theory, which is the well-known recipe to secure "prepotency," lies in the danger of fostering tuberculosis, which is more frequently found where in-breeding has been practised. This is a problem that must be faced by the dairy farmer, who should leave no stone unturned in his attempts to solve it, or at any rate, so to reduce it by careful mating of his animals that in-breeding cannot be said to be the cause.

Only by breeding from good dairy stock on both sides can any improvement be looked for in our milking herds, and to do this the peculiarities of the good milking cow must be thoroughly studied, the escutcheon theory mastered, and the ancestry of the parents on both sides ascertained; but even then, unless the feeding and bringing up of the young stock is intelligently carried out, all previous work may be rendered perfectly useless.

In my opinion, many calves and cows are spoilt by overfeeding, but this will form the subject of the next chapter.



A DAIRY WITH DETACHED SCULLERY.

CHAPTER III

FEEDING OF DAIRY STOCK

IN the previous chapters, the composition of milk and the special characteristics of dairy cattle have been considered, the early histories of two breeds being referred to, with a view to show that by care and selection on the part of the breeder a totally different type of animal, although belonging to the same species, may be produced not only in form, but in its adaptability to the purposes that were in the minds of the breeders.

In the present chapter, another and equally important subject will be discussed, viz. the question of feeding both the young and adult animal, from an economical point of view, keeping in mind the special object, the production of milk.

Economy in feeding dairy stock is a subject worthy of far more consideration than it receives, although by economy, stinting the cows of food is not intended, but so feeding them, that they receive and return the full benefit of what they are having. Overfeeding, or feeding with the wrong sorts of food, is almost as wasteful as underfeeding, since in both cases there is a loss; in the one, the animals not thriving or milking as well as they should; while in the other they are apt to put on flesh to the detriment of the quality

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and quantity of the milk they are giving. This over-feeding of milking cows seems to have been more practised in England than elsewhere, the bulk of the farmers and breeders alike appearing always to have the carcase value of the animal in mind. If we go back to the days of Bakewell and the Collings, we find that the improvements made by them were with the one object of breeding beasts that would fatten, although the Collings appear occasionally to have tried to combine milk with beef. Their system of feeding was, no doubt, carefully gone into, but I suspect the old adage "a calf must not lose its calf flesh" was then, as too often now, the rule, even in those cases where the calf was intended for the dairy. The times they lived in were different from the present, for while the demand for milk and dairy produce was comparatively small, there was a great opening for them in the way of improving the butcher's beast, and to differentiate between the calves intended for the dairy, and those intended for fattening, probably never occurred to them.

In the Channel Islands a different system of feeding prevailed from the earliest times, and is still in force. Heifer calves are taken off new milk at a very early stage, and are fed on skim or butter milk; hay, bran, and crushed oats are often given them in small quantities, while oil-cake is conspicuous by its absence. In the summer months they are tethered out on grass, so that the quantity of that is also regulated. By these methods, the milking properties of the breed have been preserved, a fat cow being rarely, if ever, seen.

The late Mr. J. P. Marett, of St. Saviour's, the breeder of "Golden Lad" and "Oxford Dahlia," one of the most successful of the farmers and exhibitors in Jersey, told me that he never exhibited a yearling heifer for a prize, as the feeding required to get her into show condition would ruin her future prospects as a milker. His opinion was most valuable, for he won probably more prizes with his own stock as a breeder, in the two-year-old classes, than any other of his contemporaries, his heifers-in-milk being always remarkable specimens.

Between these two different ways of rearing calves there is a wide divergence, but I am convinced that the Jersey plan of feeding is the right one, if the animals are intended for the dairy, it being more in accordance with the natural course of feeding. Such a system of feeding must not, however, be taken to apply to those cases where the stock are intended from their birth to be fed for the butcher (as the sooner they are got off the better), but only to calves that are to be brought into the herd as milkers. It is, however, just the omission on the part of the farmer to differentiate between the two purposes for which cattle are required, that has done so much harm to the dairy breeds of cattle in this country, as is exemplified in the condition of the dairy stock, other than Channel Island, which are shown at the breeding or summer shows of our various Agricultural Societies. With few exceptions, heifers are shown in almost "Smithfield" form, and even in the pure dairy breeds the temptation to make the young stock look fat and sleek cannot be withstood. The fault lies with the judges, who apparently

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in many cases ignore the points of a dairy cow, and give their awards on fat stock lines. Exhibitors naturally study the likes and dislikes of the judges, and feed their animals accordingly ; while the eyes of the critics being accustomed to seeing animals in fat condition, speak of those that are shown in store or natural form as "off bloom," &c., just as if this was an essential in a breeding class.

In an article on "The Compounding of Rations for Farm Stock," in the *Journal of the Board of Agriculture* for September 1902, the question of feeding stock of all sorts is most ably discussed, and the "albuminoid ratio" very clearly explained. A table giving the average percentage of digestible constituents in ordinary food-stuffs is included, showing the albuminoids and amides, the fats, and the carbohydrates separately. Multiplying the fats by 2.44 to bring them into their equivalent in starch, and adding the product to the carbohydrates, the "albuminoid ratio," *i.e.* the ratio of the albuminoids to the total non-nitrogenous constituents considered as carbohydrates, is shown, and from this table the food rations for the different classes of farm stock are calculated on certain principles which are set forth at length.¹

THE FEEDING OF CALVES AND HEIFERS INTENDED FOR THE DAIRY.

In the case of sucking calves, the "albuminoid ratio" is given as 1 to $3\frac{1}{2}$, and for half-grown cattle,

¹ See also "The Chemistry of the Farm," by R. Warrington, F.C.S., Bradbury, Agnew, & Co., 1881.

growing and fattening at the same time, as 1 to 4 or 5. In my opinion, foods compounded on such lines, after the first week or two, are far too rich in albuminoids, or flesh-formers, for young stock intended for the dairy. Such animals do not require to be fed like calves being got ready for the butcher, the experience of breeders of dairy stock being that heifer calves overfed with too rich foods when young will never grow up into the best milkers. A heifer calf fed on new milk for a long time, as is often the case, will at an early age develop a fleshy udder, although she will seldom, if ever, be worth much as a milker; yet, judging from her appearance when young, she should turn out a first-rate dairy cow.

To avoid the risk of spoiling heifers and calves when young by overfeeding them, a wider "albuminoid ratio" should be fixed upon than 1 to 4, my opinion inclining to one of 1 to 6 or 7. Calves intended for the dairy should be fed on new milk for the first week or ten days, dependent on their growth and state of health, and from that time separated milk should be mixed with the new milk, until at six weeks old they should be on separated milk only, no linseed or other rich food being added to the milk. At three or four months old the separated milk should be given up altogether. Crushed oats, bran, and sweet hay should supplement the milk in the early days, and after the calves are weaned they may have swedes, cabbage, mangels, with hay and straw chaff. I do not attempt to give the exact quantities, as there are few animals alike, and what will be too much for one may not be

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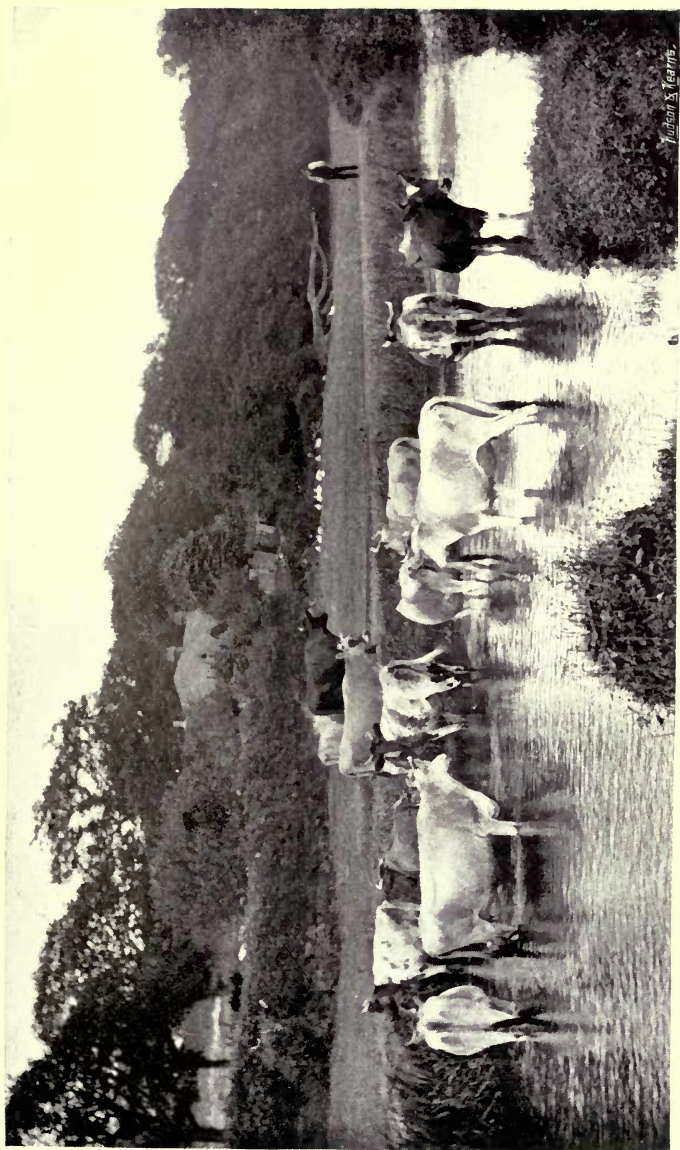
enough for another. What the successful breeder wants is to see his heifer calves growing up strong, healthy, and vigorous, but not fleshy. This can be accomplished by carefully studying the feeding and noting the growth and condition of the young animals. Rock salt should be within the reach of every beast, whether it be young or old, fattening or milking, as this is an economical way of keeping them in health.

THE FEEDING OF COWS.

But if economy can be practised in the feeding of young stock, there is a still greater field for effecting a saving, and so preventing a waste of food, in the feeding of milking cows.

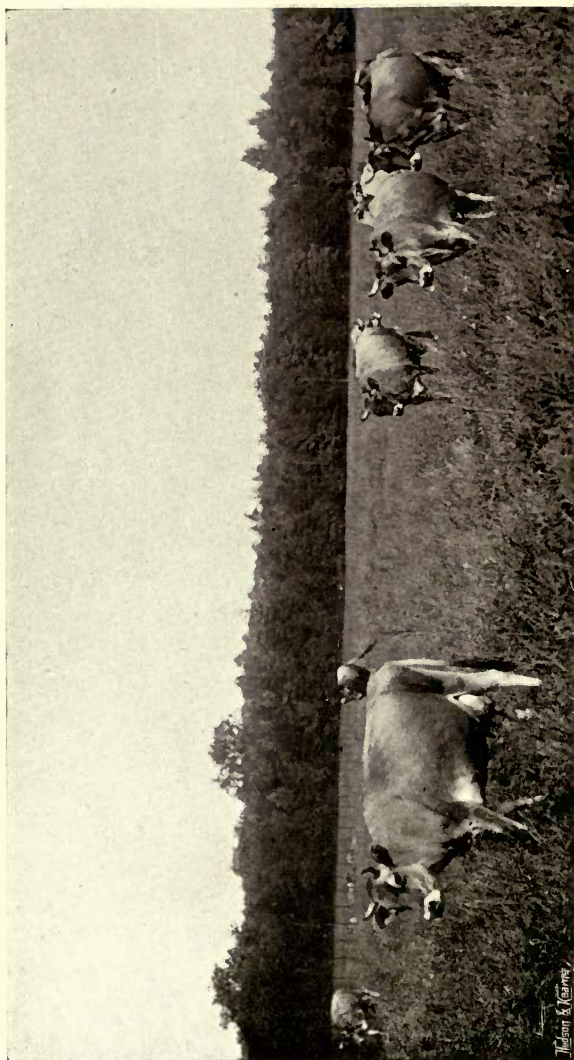
For many years, and even occasionally now, a commonly accepted theory has prevailed that high feeding makes rich milk. The cow has been likened to a pump, into which, if one would get good returns, liberal supplies must first have been poured. As a result of such teaching, the overfeeding of milking cows has been generally in vogue; and until the investigations of late years have shown the contrary to be the fact, the natural conclusion that would be arrived at by any careful thinker would be, that as an excess of foods rich in albuminoids improved the condition of the cow, while she was also milking well, so the milk she was giving would at the same time be better in quality.

This notion, coupled with the fact that many farmers and dairymen do not attempt to breed from



Fulton & Kearns.

SUMMER-TIME.



GOING HOME TO BE MILKED.

W. H. & J. H. H. H.

their cattle, but sell them when dry to the butcher, will help to explain the methods of feeding, and the food rations that have been recommended from time to time for cows in full milk. It is now, however, generally recognised that although the quantity of milk a cow yields may be slightly increased in quantity by the use of certain foods, it is always at the expense of the quality.

Cows give the largest quantity and the best milk during the months of May and June, when they are feeding on the spring grass. At that time they will also improve in condition. The "albuminoid ratio" of grass at that time of year is 1 to 5, and consequently 1 to 5 has been fixed as the proper "albuminoid ratio" for the food of milking cows at all seasons. This I believe to be too rich a diet, for the following reasons: first, because the milk is not so rich in proportion to its weight as when the cows are giving less; and second, because the cattle are improving in condition. The percentage of fat in milk in the spring of the year is usually lower than in the summer months, when the yields are not so large, which is borne out by the analyses and butter ratios of the cows which have been tested at the spring shows.

In ordinary seasons, as the summer passes by the quantity of milk decreases, but the quality of the milk does not go down *pari passu* with the smaller yield. The cases of unequal milking at ten and fourteen hours, also show that with an increased quantity of milk there is not a corresponding increase of richness, the percentage of fat being usually less,

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although, as shown in the previous chapter on milk, the actual weight of fat may be the same. The evidence taken before the Commission which sat for the purpose of recommending a standard to be fixed for milk further confirms these views, which may be summarised as follows: That when the milk yield is increased, either by feeding, or by the cows being milked at unequal periods of time, the excess quantity of milk given is not so rich in the percentage of fat as the lesser quantity would have been. If this be correct, it would seem that an "albuminoid ratio" of 1 to 5 is too rich for cows in milk (since it tends to make them put on flesh), and that probably one of 1 to 7 or 8 would be more profitable. The fact that the "albuminoid ratio" of the grass in the spring is 1 to 5 is nothing to the point, as at that season of the year, in the ordinary course of things, all animals would naturally produce their offspring, when temporarily better food would be required for the dams; while as the season progressed the quality of the food would deteriorate until the "albuminoid ratio" would be very far from 1 to 5. To feed cows in milk, no matter when or how long they have calved, on a consistently rich food must, I think, be wrong. After parturition, the cow requires extra feeding to enable her to pick up again, but to continue to give her food too rich in albuminoids, if she improves in condition, is the reverse of profitable. If a cow in full milk puts on flesh, she does so at the expense of the quality of the milk, since the milk will get poorer as the cow gets fatter. In the cases of droughts, which have been

FEEDING OF DAIRY STOCK 41

frequent in the south-eastern counties of England during the past ten years, it has been noticed that while the cattle thrive well and looked in good condition (baked food being better than boiled), the milk yields fell off considerably, while the quality was found to be poor, being deficient in fat, and solids other than fat, notwithstanding the extra food that was being given them to keep up the flow of milk.

During one such season I was shown the food rations that were being given to three herds of milking cattle (ranging from 15 lbs. to 18 lbs. of concentrated foods, grains, cake, &c.), and the analyses of the mixed milks respectively of the herds so fed, although I did not see the cows. I gathered, however, that they were in good condition, as indeed they should be with such feeding. The analyses of the milks showed a deficiency not only in fat, but in the solids other than fat, caused, doubtless, by the large quantities and excessive richness of the food given.

Mr. F. J. Lloyd, in his report of the milking trials at the London Dairy Show for 1900, calls particular attention to the number of Shorthorns at those trials which gave milk of poor quality, which he attributed to a "distinct peculiarity of breed." He adds that he has "had experiments made to determine whether by changing the food the composition of the milk could be altered," but without result.¹

My explanation of this peculiarity is that overfeed-

¹ *Journal of the British Dairy Farmers' Association*, vol. xv. part iv. 1900.

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ing from their birth with foods too rich in albuminoids predisposes cows to put on flesh rather than milk well. Cows fed and bred for the butcher are different in shape to those bred for milk, and appear to have a special tendency to fatten. To such cows, when in milk, a diet poor in albuminoids should be given, a ratio of 1 to 7 or 8 being to my mind preferable to one of 1 to 5.

My experience of feeding cows in milk points to the conclusion that too great a proportion of albuminoids tends to put on flesh, while an excess of carbohydrates, instead of fattening the animal, goes to improve the quality of the milk.

Square-shaped cattle, showing an aptitude to fatten, should have a diet poor in albuminoids, say, 1 to 7 or 8, while wedge-shaped cattle can be fed with a richer mixture, viz. 1 to 5 or 6.

As an example, two feeding rations are given for cattle, showing the difference suggested above. These are the full rations for cows weighing about 1200

No. I

Lbs.	Rations.	Albds.	Fat.	Carbo- hydrates.
25	Mangolds	.27	.03	2.50
14	Hay	.76	.14	5.70
9	Oat Straw	.13	.06	3.61
5	Middlings	.45	.13	2.74
3 $\frac{3}{4}$	Decorticated (Cotton Cake) .	1.38	.38	.70
			$.74 + 2.4 = 1.78$	
		2.99		17.03



FEEDING OF DAIRY STOCK 43

lbs. live weight. The first is taken from the article on the "Compounding of Rations for Farm Stock" mentioned above, and shows an "albuminoid ratio" of about 1 to 5.6; the other is worked out on the same lines, but shows an "albuminoid ratio" of 1 to 7.

No. II

Lbs.	Rations.	Albds.	Fat.	Carbo- hydrates.
25	Mangolds	.27	.03	2.50
14	Hay	.76	.14	5.70
9	Oat Straw	.13	.06	3.61
3	Oats	.24	.12	1.44
3	Bran	.31	.07	1.33
3	Linseed Cake	.74	.28	.89
			$.70 + 2.4 = 1.68$	
		2.45	17.15	

The first of these would be suitable to a cow milking heavily, and not putting on flesh; the second to a cow that is predisposed to fatten.

To get at the right weight of food to give cows in milk, their live weight must first be ascertained, as also the date of the last calving, and the average yield of milk. Having obtained this information, their condition will be a guide to feeding correctly, while the shape of the animal will determine the quality of the food to be given. If a cow goes on improving in condition after the first month or six weeks have elapsed since calving, the feeding is too rich in albuminoids, or too liberal in quantity, which will be

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shown by the poorness of the milk ; if, on the other hand, she goes back in condition, her food rations may be improved.

Applying this theory to the cases of those Shorthorns mentioned by Mr. Lloyd, the solution appears to me to be as follows : This breed has for nearly a hundred years been bred and fed for killing purposes, and therefore the animals are prone to put on, and naturally carry, a lot of flesh. Unless fed well, they will drop off in condition, so to prevent this they are fed too highly (as the farmer who keeps them is accustomed to see his animals fed), with the result that the milk they yield is poor in quality, the excess food given them going to the formation of flesh.

The Shorthorn cattle have alone been mentioned by Mr. Lloyd, as at that time few cattle of other breeds had been tested, but in my opinion the same remarks will apply to those other breeds where a combination of beef and milk has been aimed at. I have invariably found, after examining the cows at the milking trials, that those animals whose milk has not come up to the standard required have been far too fresh.

To summarise, milk can be reduced in quality (1) by giving foods which contain a large quantity of water, and (2) by feeding on a diet too rich in albuminoids.

Both these systems of feeding are the reverse of economical, as in addition to the loss in giving too much food, the reduced value of the milk must be taken into account. If only farmers would keep the

cost of feeding their cows, and set against it the value of the milk yielded, they would soon find that the overfed animals were the reverse of profitable.

The limit, or standard of milk fixed by the Board of Agriculture, viz. 3.0 per cent. of fat and 8.5 per cent. of solids other than fat, is quite low enough, and the public are wronged if milk of this quality is supplied. There need be no difficulty in obtaining such milk if the feeding of milking cows be more carefully gone into, only the "albuminoid ratio" of 1 to 5 must not be taken as applying to all cattle alike.

The foods that produce the best flavoured milk are as follows: Crushed oats, bran, maize and bean meal, linseed and cotton cakes, cabbages, kohlrabi, carrots, parsnips, and mangels later in the season, with, of course, good hay and straw.

It is almost superfluous to remark that there are many other foods beside those mentioned on which milking cows are fed, but as milk is quickly tainted when unsuitable foods are used, I have only named those I consider the best foods, as I believe in the long run they will be found the most economical.

The amount of food will naturally depend on the live weight of the cow and the time she has been in milk, remembering always that a cow milking heavily needs more than those which are falling off in their yield, for which reason the concentrated foods should not be mixed with the chaff and pulped roots, but be measured out separately to each cow, so that the feeding may be correct in every case.

As not every farmer has a weighing-machine large

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enough to weigh cattle, the average live weights of the cows at the London Dairy Show during a period of ten years are given here, as they will be a very fair guide from which to estimate the live weight of any particular breed of cow :—

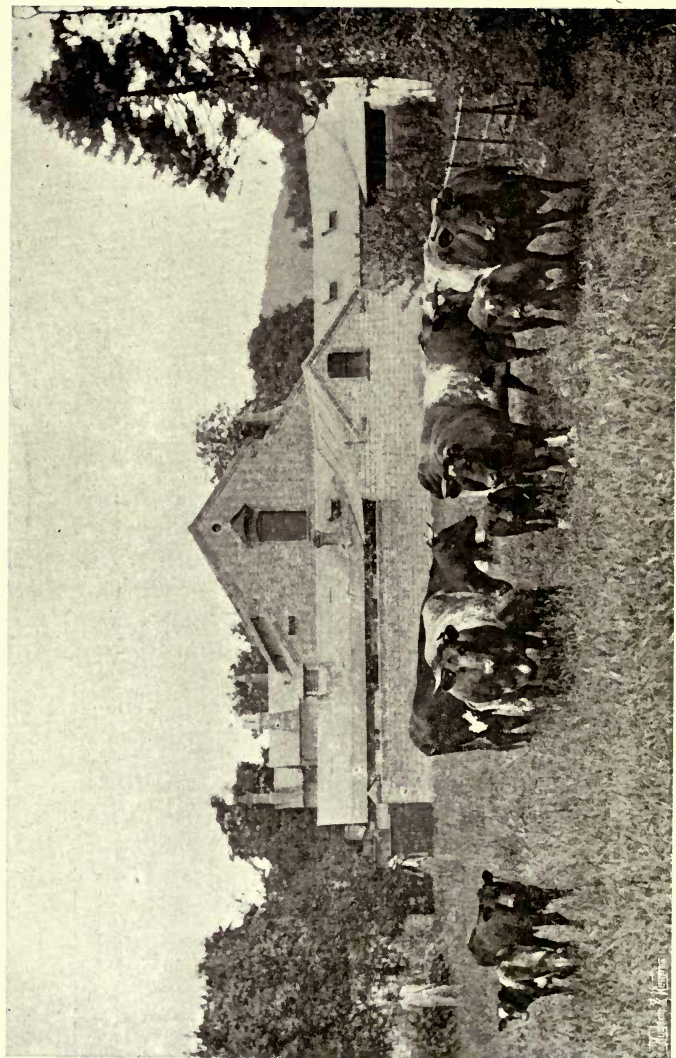
	Lbs.
Shorthorns	1405
Jerseys	881
Guernseys	1072
Red Polled	1135
Ayrshires	1147
Kerries	907
Dexters	788

These remarks on feeding and the effect of giving too rich a diet to cows in milk may not be generally approved, but as I believe them to be in the main correct, I have expressed them without reserve, since, whether right or wrong, I shall at any rate have called attention to a subject which is well worthy of consideration by farmers and breeders of dairy stock.



A RICH MEADOW.

W. H. H. & Co. N. Y.



THE HOME PADDOCKS.

CHAPTER IV

ECONOMICAL DISPOSAL OF MILK

NEXT to the economical production of milk, the economical disposal of it claims attention, under which term the selling of the milk, as well as the conversion of it into butter, is included.

In the first chapter it was shown that milk varies greatly in quality. Some samples have as much as 6.75 per cent. of fat, while others have only 2.75 per cent. These figures may be taken as extremes, but they serve to illustrate the difference in value between rich and poor milk. That containing 6.75 per cent. of fat ought to be worth more than double that containing 2.75 per cent.; and to sell both qualities at the same price would appear to be the reverse of economical, especially when it is remembered that, as a rule, cows giving rich milk do not milk so heavily as those which yield milk of poorer quality.

The dairy farmer, therefore, should first ascertain the quality of milk given by his cows, both individually and collectively, so as to be in a position to guarantee the quality of the milk he sells; or if he makes butter, to know what milk to dispense with, as not being rich enough for the purpose.

With the "Gerber" and "Babcock" testers there

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should be little, if any, trouble in ascertaining the amount of fat in the milk of any cow, provided the sample is taken accurately ; while the trouble involved in such work is amply repaid by the knowledge acquired from such tests when taken.

To ascertain the pecuniary value of milk, one must start with some given figure, and I think that the price paid by the large distributors of milk in our large towns should be a fair basis from which to work. Taking then the price of milk containing 3.0 per cent. fat and 8.5 per cent. of solids other than fat, at 1d. per pint, or 1s. 5d. per barn gallon (that is, 8d. per imperial gallon) as a fair average price, it will be easy to calculate the price of milk of better quality. Assuming that milk with 3.0 per cent. of fat is worth 8d. per gallon, milk with 6.0 per cent. should be worth 1s. 4d. per gallon. But this figure is perhaps too high, as the solids other than fat and the water in the milk are worth something, so that if the percentage of fat is reckoned at 2d. per unit after the first 3.0 per cent. of fat, it will be about right. Taking this as a basis—

Milk containing 3.5 of fat should be worth 9d. per gallon.

„	4.0	„	„	10d.	„
„	5.0	„	„	1s.	„

To show that these figures are correct, it is only necessary to calculate what butter these different milks would make, and the prime cost of such butters.

The following figures show the quantity of milk re-

ECONOMICAL DISPOSAL OF MILK 49

quired to make one pound of butter, and the cost of the same :—

$3\frac{1}{8}$ gallons of milk with 3.0 fat should make 1 lb. butter, which at 8d. per gallon will work out at 2s. 2d. per lb.

$2\frac{7}{8}$ gallons of milk with 3.5 fat should make 1 lb. butter, which at 9d. per gallon will work out at 2s. 1d. per lb.

$2\frac{1}{2}$ gallons of milk with 4.0 fat should make 1 lb. butter, which at 10d. per gallon will work out at 2s. 1d. per lb.

2 gallons of milk with 5.0 fat should make 1 lb. of butter, which at 1s. per gallon will work out at 2s. per lb.

These figures show that to estimate the unit of fat above the first three per cent. as worth 2d. per gallon is about right, where 8d. is the price of milk containing 3.0 per cent. of fat.

It is obvious, therefore, that farmers who sell milk without first ascertaining the percentage of fat it contains, stand to lose a considerable sum of money in the course of a year's trading. Where milk is sold to a factory for butter-making, it is generally paid for on a scale which takes into account the percentage of fat, and it appears to me, that either the milk distributor must be prepared to do the same, or must be content with milk of the poorest quality, which must always be more or less risky. The trouble involved in testing the milk of individual cows is not so great as may be imagined, as it is only necessary to try each cow once or twice while they are in milk, to get a fair idea of

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the quality of milk they yield. The breed of the cow and her touch are very good guides as to the quality of her milk, as has been mentioned in a former chapter, while the comparison of the analysis of the milk with the estimate formed of the cow's value by external signs, is of the greatest help to the breeder.

Where possible, the farmer should try and sell his milk direct to the consumer, although that may involve more work, as he will get the full retail price for it, instead of sharing it with the railway companies and the milk-sellers in the towns.

If, however, he has not a market at his own door, he must sell to the milk-distributing firms, of whom there are many of the highest repute; but in his own interests, he should always join his local milk association, if such a society exists in his district, as these bodies can do more than an individual in keeping the price up to its fair value. It is, of course, a moot point whether the public will pay more for the better qualities of milk, except in the more fashionable quarters of our large towns, where infants and invalids are specially catered for, or where there is a good demand for cream; and consequently the farmer who sells milk of better quality will not ordinarily get more for it than the market price for milk containing 3.0 per cent of fat. Obviously, then, he will only undertake to supply milk up to that standard, and he should as nearly as possible keep it up to that quality only. He should have no difficulty in doing this, if he is not trying to fatten off his cows at the same time for the butcher, but where this is the case, he must keep one or two

ECONOMICAL DISPOSAL OF MILK 51

Channel Island cows to ensure the milk being up to the requisite richness.

If there is occasionally some slight loss in selling milk of too good quality at the price of the ordinary standard, there is a still greater loss in using poor milk for making butter, although this is very frequently done. The butter ratios of the various breeds of cattle tested in the Show grounds during the past ten years prove that under the most favourable circumstances it only pays to make butter from the richest milks.

To make this plain, the quantity of milk of each breed that is required to make one pound of butter is here given, the ratios having been altered from pounds of milk to gallons, the liquid measure appealing more to the eye. These figures are taken from the London Dairy Show report of 1901.

3 gallons of Red Polled milk made 1 lb. of butter.

$2\frac{17}{20}$	„	Shorthorn	„	„
$2\frac{13}{20}$	„	Ayrshire	„	„
$2\frac{3}{20}$	„	Guernsey	„	„
$1\frac{18}{20}$	„	Jersey	„	„

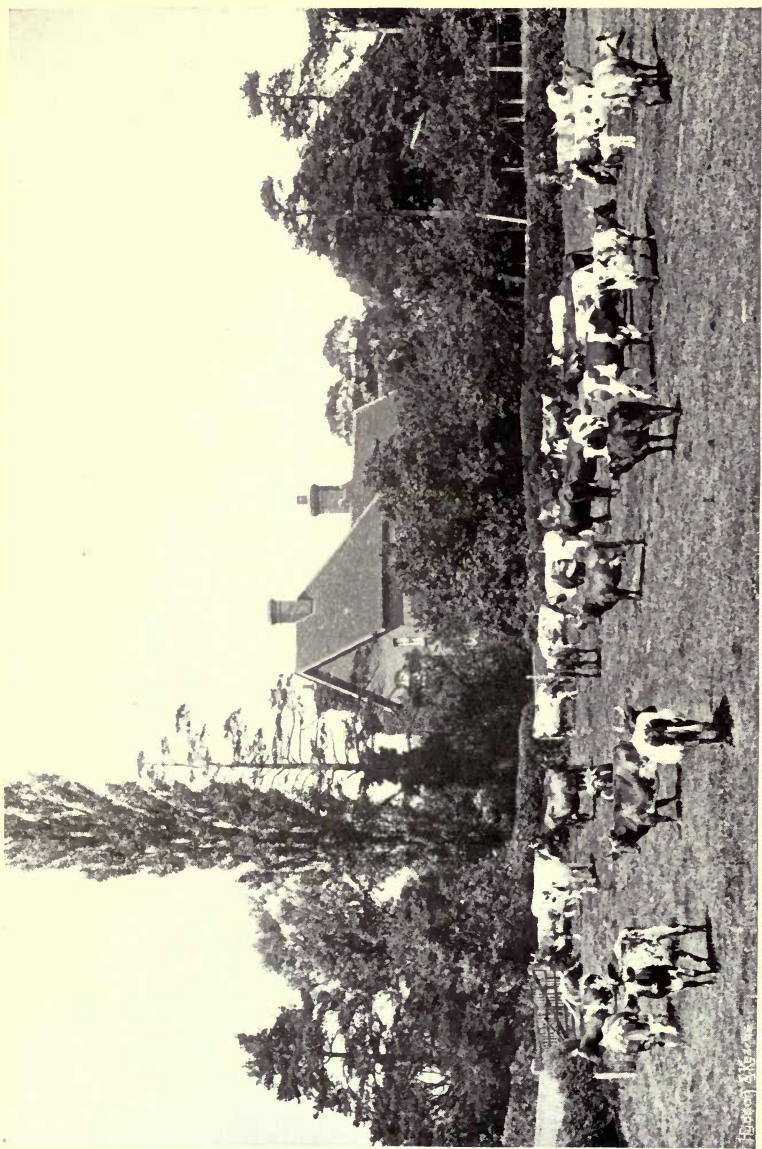
Estimating the value of the milk throughout at 8d. per gallon, the cost of one pound of butter, allowing 1d. per gallon for the separated milk, will be as follows :—

Red Polled butter	.	.	.	1s. 9d. per lb.
Shorthorn	„	.	.	1s. 8d. „
Ayrshire	„	.	.	1s. 6½d. „
Guernsey	„	.	.	1s. 3d. „
Jersey	„	.	.	1s. 1¼d. „

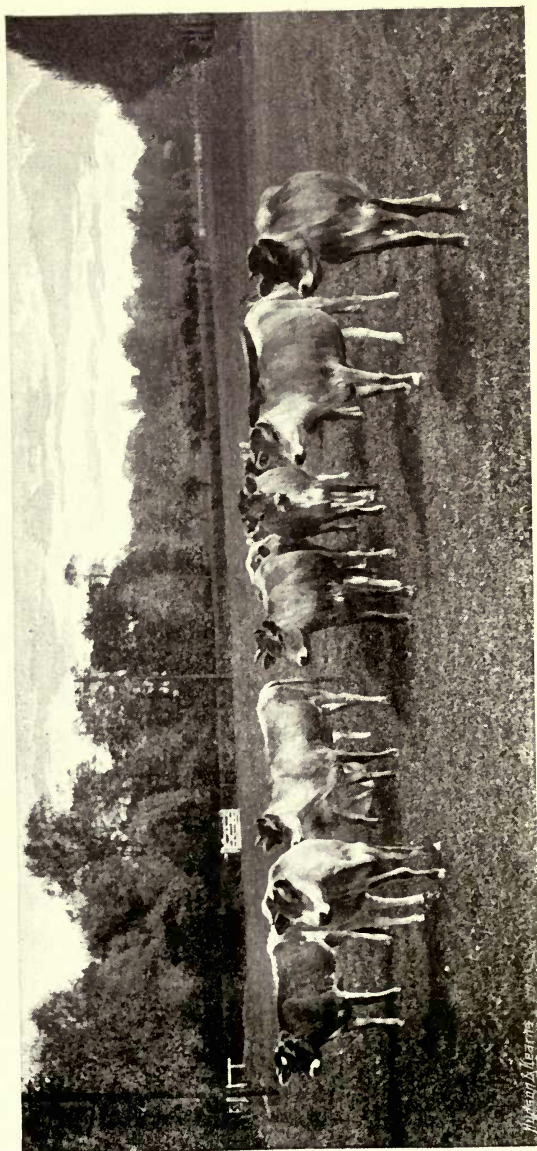
These figures, however, do not really represent all the loss that is made by using poor quality milk for making butter, since they only show the prime cost of the milk used, while, until the selling price of the butter made is ascertained, the profit or loss cannot accurately be gauged. As stated in a former chapter, the richest milk makes the best butter, both in flavour and colour, consequently the butters made from those milks which show the lowest ratios will be the best, and will command the highest prices. In the case of the best Channel Island butters the prices usually vary from 3d. to 4d. above the butters from other breeds of cattle, so that the loss in making butter from milk from cows with a high butter ratio is considerably larger than the figures above given disclose. This will explain the truth of the old saying, when applied to the milking cattle in England, that "butter-making would break the Bank of England."

The conclusion of the matter appears to be as follows: Where milk-selling is to be profitable, the cows should be of the following breeds—Shorthorns, Red Polled, Ayrshires, Welsh, Devons, Kerries, and Dexters; where butter is made, the cattle should be either Jerseys or Guernseys.

The disposal of butter is a very difficult problem, owing in a great degree to carelessness of our dairy-farmers in the past, the inferior butter turned out by them encouraging the importations from abroad. There is only one way to compete with the foreign and colonial butters, and that is by producing a better article, to do which requires the greatest



A DAIRY HERD.



JERSEY HEIFERS.

W. H. & L. H. H.

ECONOMICAL DISPOSAL OF MILK 53

skill and care, not only in the dairy work, but also in the feeding and general management of the cattle.

The best butter that is made is that from private dairies where Channel Island cows are kept, and where proper attention is given to the feeding of the cattle, and to every other detail. The demand for this class of butter is small, and the supply is equally limited, a mere drop, as it were, in the ocean of the demand. The smallness of the demand is accounted for by the fact that few, other than those who have always had their own dairies, know the taste of the finest butter, the public having been educated to the flavour and appearance of the imported butters, which are made on a large scale, and differ entirely from the home-made produce. Where really first-class butter is forthcoming it commands the highest price, and rightly so, because it costs more to make, the dairy work being entrusted to one person, whose time is not so fully occupied as it would be if employed in a factory, where much larger quantities could be turned out at the same cost. The factory system has, however, this disadvantage, as compared with the private dairy, that although it can deal with larger quantities of milk and butter at a comparatively small cost, it cannot control the feeding of the cattle, nor can it insure that all the milk brought from outside to be dealt with is of the right quality, or from cattle in the best health. Consequently, to turn out butter of uniform quality and appearance, colouring matter and overworking are resorted to. Therein lies the great drawback to

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factory butter, which never can compete in quality with that made in the best private dairies.

Although it is not my purpose to criticise the quality of the various butters that come into England, I cannot refrain from saying that, in my humble opinion, the Colonial butters are much better than the Continental ones, being of a truer butter flavour.

The only way to make butter profitably in England, therefore, is to sell first hand, to turn out the highest quality, and so to get the highest price ; and to do all this, only a small private trade can be attempted. Factories in England to be profitable must be co-operative, and should try and supply direct to the consumer, otherwise they cannot pay the price for the milk that the farmer can get if he sells it for distribution. In Ireland the case is different, because there is not so large a demand for milk for consumption as here.

Where cream, whether sweet or scalded, can be sold, it is often more profitable than disposing of the milk or making butter, if a separator is used ; as the cream usually fetches a higher price than the butter made from it would realise, while at the same time the farmer has the benefit of the "sweet" separated milk.

There is, however, almost as much loss in selling cream from milks of poor quality as there is in making butter from them, and therefore, where cream is sold, only those cattle should be kept whose milk is rich in fat.

ECONOMICAL DISPOSAL OF MILK 55

The quantity of milk required to make a gallon of cream varies very greatly in the different breeds of cattle, as will be seen from the report on the Churnability of Cream Trials conducted at the Bath and West of England Shows at Croydon and Plymouth in 1901 and 1902.¹

The value of separated milk ought always to be taken into account in calculating the profits made in selling cream or butter, as in the course of a year it will amount to a considerable sum of money.

Separated milk is most useful where stock are reared, or pigs are fattened, to say nothing of the ready sale it has in some places on account of its low price and its digestibility.

It is said that there is a great future for separated milk, in consequence of a recent invention. By evaporation, the water is got rid of, leaving as a residue the "solids other than fat" in the milk, but it is questionable whether putting up the necessary machinery to do this will pay the farmer, or whether he will get as much for the separated milk if he sells it this way, as it is worth to him if he uses it himself in feeding stock, &c. Time alone will show this.

Meanwhile, since the demand for new milk is very great, and is daily increasing, the importance of trying to recover the butter trade is not urgent, but as there may be farmers so situated that they cannot do a milk trade, the above hints *re* the quality of the milk suitable for making butter may be worth considering,

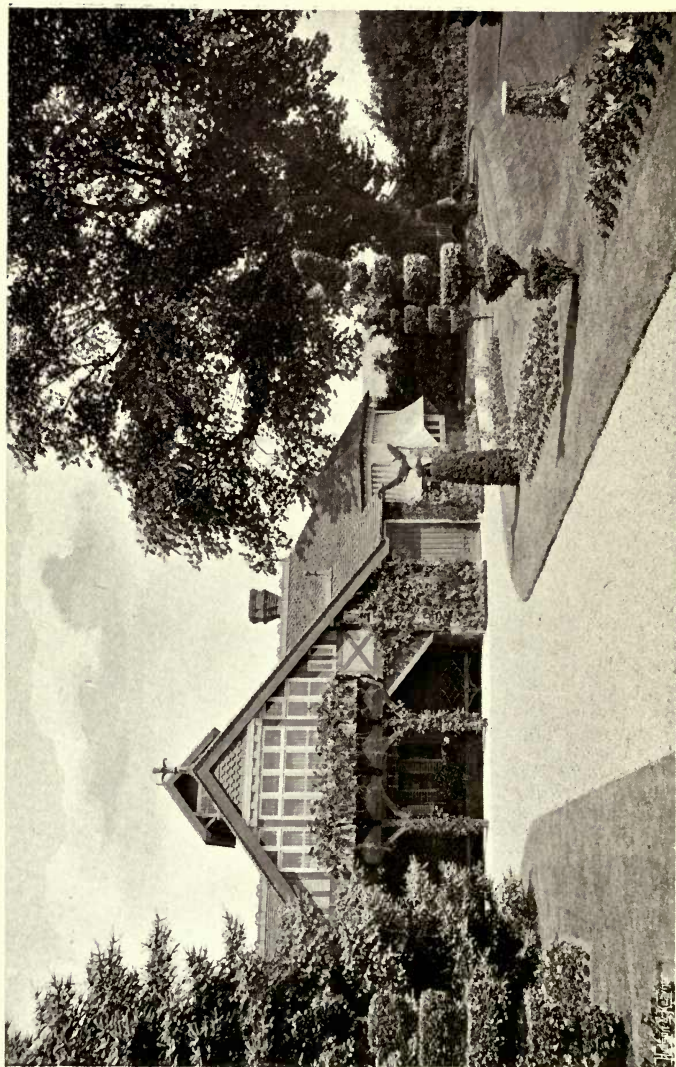
56 ECONOMIES IN DAIRY FARMING

since by following them at least they will be saved from the losses that, I believe, many farmers have suffered in the past. For the benefit of any so placed, the few remarks on the making of butter in the following chapter are given.

A case of selling milk "deficient in fat" has lately come before the Superior Courts that may be of interest to farmers selling milk. The cattle had been milked at unequal periods of sixteen and eight hours respectively, and this was held to warrant the Magistrates in finding that the milk was not of the nature, substance, or quality of ordinary milk, the length of time between the two milkings naturally making the milk in the one case exceedingly poor in quality. To get over this difficulty, where it is impossible on account of difficulties of transit or other circumstances to milk at fairly equal divisions of time, the milk-selling farmer will have to see that some of his cattle give milk considerably richer in fat than that yielded by the average dairy cow, and this can only be done as stated above by using Channel Island cattle or cows with similar attributes.



A MODEL COWHOUSE.



QUEEN ALEXANDRA'S DAIRY.

CHAPTER V

HINTS ON BUTTER-MAKING

ALTHOUGH the bulk of the dairy-farmers in England supply milk to the large towns, or, in districts where cheese has a local habitation and a name, turn their milk into cheese, yet it is possible that occasionally there are farms so situated that the only trade left to the occupiers is that of making butter, and to them the remarks in the present chapter are addressed, as I believe there is more money thrown away in making butter than can be imagined by those who have not given any consideration to the subject.

It has been shown in previous chapters that to make butter from unsuitable milk is the reverse of economical, the cost of the milk and the quality of the butter both militating against any profit, therefore no more need be said on that head.

Again, the best foods for cows whose milk is to be made into butter have been pointed out, so to say that unless the milk is good, the butter cannot be good, may appear redundant; but a very common mistake is often made by advocates of indiscriminate feeding, viz. that swedes and other strong-tasting foods will not affect the flavour of butter if only a little saltpetre is put with the milk, or the strong-tasting foods fed after milking. In my opinion, both

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these opinions are wrong, and the feeding of butter cows on swedes, grains, decayed cabbage, or any other strong-flavoured foods will always produce butter of inferior quality, which will be worth considerably less than the same butter would have been had the cattle been fed correctly.

Cleanliness in the cowsheds and in the milk-room is next in importance to the feeding, as milk readily absorbs unpleasant flavours, which will be transmitted to the butter. For this reason milk should not be left in the cowsheds, but should be taken at once to the dairy or separating-room. The milk, too, from cows that are not well, even if the ailment be only of a temporary character, should never be taken to the dairy for use.

But even supposing that the milk is right in every respect, waste may occur from neglect of some of the first principles of butter-making. To begin with, butter should not be made from perfectly sweet cream as, no matter to what breed the cattle belongs, there will be waste, the smaller globules of fat escaping in the buttermilk.¹

Again, to separate at too low a temperature, or to run the cream too thick, are both wasteful methods, the temperature for separation being always best when over 90° Fahr., while the cream should be run out quite thin—the thinner the better.

To churn at too high a temperature is also likely to cause loss, particularly when sweet cream is used, or in the summer time, when the weather is hot and

¹ *Journals of the Bath and West of England Society*, 1901-2 and 1902-3.

HINTS ON BUTTER-MAKING 59

ice is difficult to obtain.¹ The temperatures for churning should vary from 52° to 58° Fahr., dependent on the time of year and the temperature of the outer air when ripened cream is used, but with sweet cream, 54° to 56° Fahr. is quite high enough to start with. If there is any difficulty in getting the butter to come, a little warm water at about 75° may be added later, when the cream has got into what is known as the sleepy stage, as no loss will result from the subsequent rise in temperature.

In working the butter, too often mistakes are made. Overworked butter will never command so good a price as that which is properly made up, as it not only does not keep so well, but looks greasy, and, in consequence, will not pack so neatly.

To avoid overworking, I strongly recommend the use of a drying-machine, of which there are many in the market at reasonable prices.

Butter dried in these machines requires very little working on the butter-worker after it comes out of the drier, a few turns, to get it together, being all that is necessary. The grain in the butter, too, is preserved, which makes a considerable difference in the value.

The saving of labour by using these machines is very considerable, the work of turning the drier being much lighter than manipulating a butter-worker; and where a large quantity of butter is turned out, this is a consideration that will weigh much with any one who has had experience of the hard labour involved in working and making up a big batch of butter.

¹ *Journals of the Bath and West of England Society*, 1901-2 and 1902-3.

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Another great advantage from using a drier is that the butter cannot be overchurned, as, if it is, the drier cannot be used carefully; if, therefore, it is found that the drier has not been used, it may be taken for granted that overchurning has taken place.

Bad butter, that is, soft overworked butter, will not pack nicely, and this alone will take something off the price, while the best not only always packs well, but looks on that account alone worth more money.

Butter should not be made up into pounds directly it has come off the worker, but be left for an hour or two, as it gets firmer and makes up better than when finished straight off. After being weighed (and a quarter of an ounce should always be allowed to every pound to insure good weight), it should be packed in butter paper, the paper having been first cut into the correct sizes ready for despatch. Where a retail trade is done (and, of course, that is preferable, as the whole of the profit goes to the farmer), and the butter has to go by train or post, I would always advise wooden boxes, since the butter travels much better in them than when put in paper boxes. Wooden boxes can be obtained almost as cheaply as paper ones, and the extra cost (if any) is repaid by the better state of the butter on arrival.

Attention to these few details, although they may appear to be trumpery, will often make the difference of a penny or twopence per pound, which in the course of a year will amount to a considerable sum.



SOME GOOD BUTTER COWS.



AT THE BROOKSIDE.

CHAPTER VI

ACCOUNTS

THE keeping of proper accounts is necessary in all business firms, in order to see not only what profit or loss is made, but to ascertain the weak spots of the concern, and to try and make improvements where they are wanted.

In a dairy-farming business two accounts are absolutely required apart from the ordinary ones, in order to prevent waste of labour and food. The first one should show the prime cost of keeping up the herd and the gross sales of produce. The second should give the actual weight of milk yielded by each cow or heifer, and the analysis of the milk or the butter ratio.

These two accounts are not so difficult to keep as they may appear, an hour per week being all that would require to be spent on them in point of time, while the good that would result from them would amply repay the trouble involved in keeping them up.

The first of these accounts will consist of two columns, headed "Receipts" and "Payments" respectively, the items of which will be placed on two pages facing one another.

The receipt or left-hand column will consist of the following items: First, the live cow stock at the commencement of the year, as per valuation, under

62 ECONOMIES IN DAIRY FARMING

which will be entered, in order of date, the weekly labour bill, to include only the wages of those who are always with the cattle, the amounts paid weekly for all purchased foods, and any additions to the herd. These items will be written up each week. All hay used, and all other foods or litter grown on the farm, should be valued and placed, say once a month, into the account, while the meadows used for grazing must equally be valued and added to the other items.

On the opposite page will be entered the weekly sales of milk or other dairy produce and live stock, to which will be added at the end of the year the valuation of the live cow stock.

The difference between these two accounts at the end of the year will show the profit or loss on this particular branch of the farm, while by deducting the valuation of the stock at the commencement of the year and the price of all animals purchased, and dividing the remaining figures by the number of cows in milk, a very fair idea of the cost of labour and food for each animal will be arrived at.

In an account like this, one thing is requisite, viz. honesty towards oneself, for it is obvious, if the valuations are not taken out fairly, the figures will be most misleading, and cannot be of any practical use—in fact, the time spent on them will be really wasted.

The fairest way to value one's live stock is, in my opinion, to write them down at the price one would care to give for them in cold blood, putting aside all question of pedigree value. In the same way the hay,

corn, roots, and straw grown on the farm, must be put down at the prices at which they can be sold.

With labour there is a little more difficulty, as in the summer months the cowmen on an ordinary farm are able to get out into the fields and do other work, but as this item will be entered up weekly, there cannot be much trouble in putting down the correct figures.

The second account, giving the weight of milk given by each cow, is apparently one involving more trouble, but where milk is sold there need not be much extra labour involved. On one day per week the weight of each cow's milk, both morning and evening, should be taken and entered in a book kept for the purpose. The total of the day's milk, multiplied by seven, will give the weekly yield, which should correspond with the gross total sold.

A small sample should be taken now and then for analysis by the Babcock or Gerber testers, which result should be recorded as a check on the quality of the milk where milk is sold, and on the churning where butter is made.

This record of the milk will show (*a*) the value of each individual cow and (*b*) the gross total of milk yielded by the herd, which, when compared with the cost of labour and food, as given in the other account, will further show the profit or loss on each animal and on the whole herd.

Allowance must, of course, be made for the age of each individual cow, as it is unreasonable to expect a heifer to milk as well as an old cow. The live weight

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of each beast must also be noted, so that the estimate cannot be as accurate as might be wished where the cattle are a mixed lot ; but with all these drawbacks the accounts will be found well worth keeping. In all these transactions, however, honesty towards oneself must be borne in mind, for to overvalue stock for the purpose of making the accounts appear better than they really are, putting aside the immorality of the transaction, is both foolish and misleading.

Farm accounts, and especially the extra accounts such as the two above mentioned, are most economical in their tendencies, causing money frequently to be saved, which without them would be assuredly lost. An example of each of the accounts mentioned is given on pages 65 and 66, which will illustrate how they should be kept. The figures are purely imaginary.

No. I

[illegible]

No. 11.

JANUARY 1903.

Name of Cow.	Milk.			Date.	Milk.			Date.	Milk.			Date.	Milk.			Date.	Ana- lysis.	Churnings.									
	Morn.	Even.	Total.		Morn.	Even.	Total.		Morn.	Even.	Total.		Morn.	Even.	Total.			Date.	Fat.	Butter Ratio.							
																				lb	oz.	lb	oz.	lb	oz.	lb	oz.
Flora	15 4	14 10	29 14	2nd	15 0	14 4	29 4	9th	14 4	14 4	29 4	16th	14 4	14 4	29 2	23rd	14 12	14 0	28 12	30th	14 8	13 14	28 6	16th	5 0	1 9	18 64

An account on similar lines to this last, if regularly kept, is useful in more ways than one. A breeder who wants to sell his cattle is always more or less dependent on the reports of his cowman, who, however honest and straightforward he may be, is apt to judge a cow by her performances at the time of asking. If, for instance, she has lately calved, she is reported as a good milker; if, on the contrary, she has been in milk for some time, she is only a fair milker; whilst sometimes she is put down as a moderate cow, this latter usually happening when it is a question of drafting out and sending inferior animals to the butcher.

It is at such times that the milk book is invaluable. The figures speak for themselves, and very often, and not unnaturally, show that the cowman is quite out in his estimate of the value of the animal. In selling cows the purchaser can usually judge by her appearance, and the milk book, if produced, will tell her value, so that the question of price is not one about which there need be much contention.

The breeding of all sorts of live-stock requires care, attention, and recording of details; otherwise, like any other business, unless looked after properly, the results will be disappointing.

There has been in the past among our dairy farmers far too much carelessness. If fifty years ago the butter question had been tackled properly, I do not think the foreign imports would have been so large as they are to-day, and I fear that even now, unless the question of manufacturing good milk at a reason-

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able price is gone into more thoroughly, foreign supplies will come in in larger quantities than at present, the facilities of transport being made so easy.

The breeding, feeding, and management of dairy cattle should be studied closely, and in writing this no new doctrine is set forth; for what says the "Wise Man" of old? "Be thou diligent to know the state of thy flocks, and look well to thy herds, for riches are not for ever" (Proverbs xxvii. verses 29 and 30).



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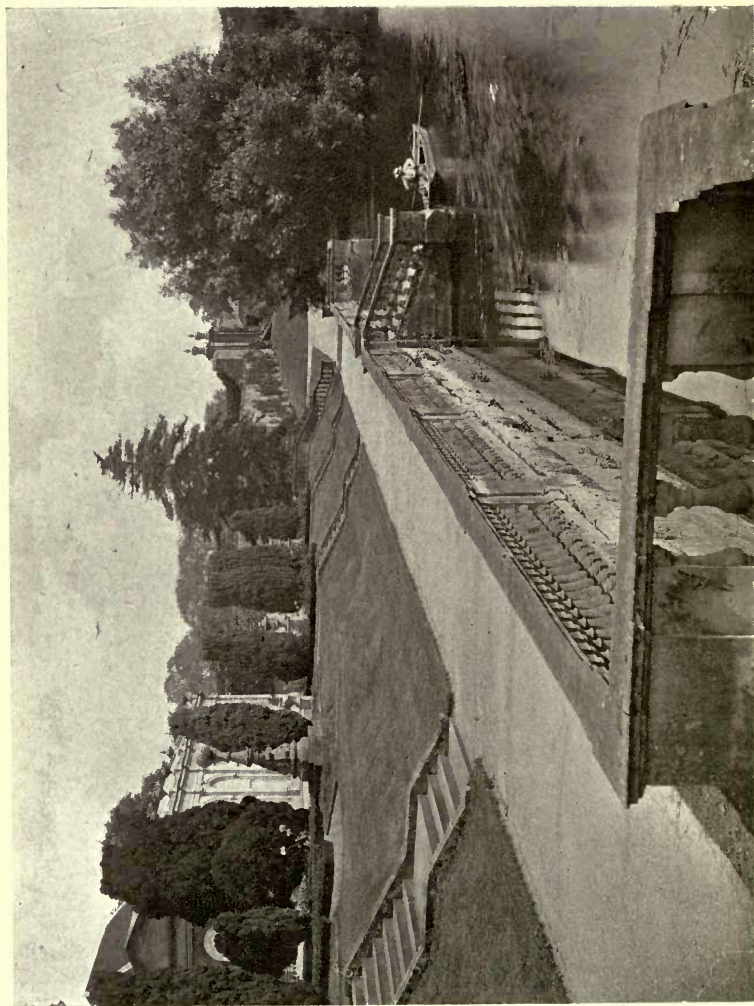
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A BORDER OF HARDY FLOWERS.

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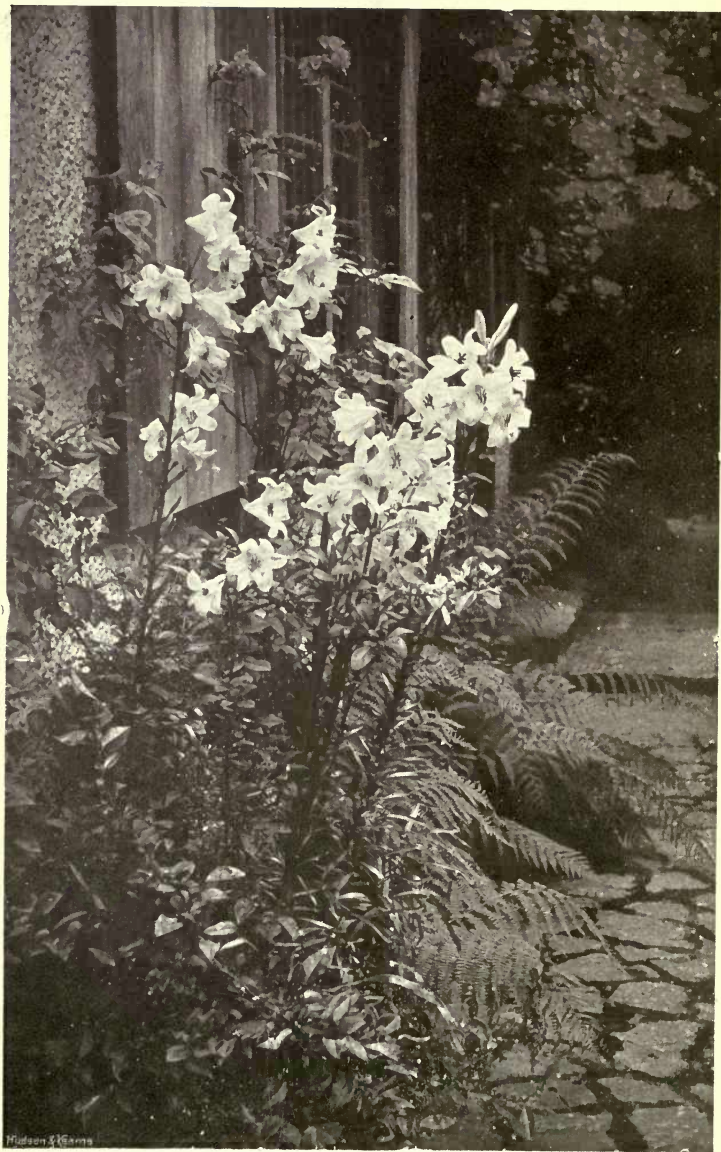
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Specimen of Illustration.



IBERIS AND CERASTIUM IN THE DRY WALL.

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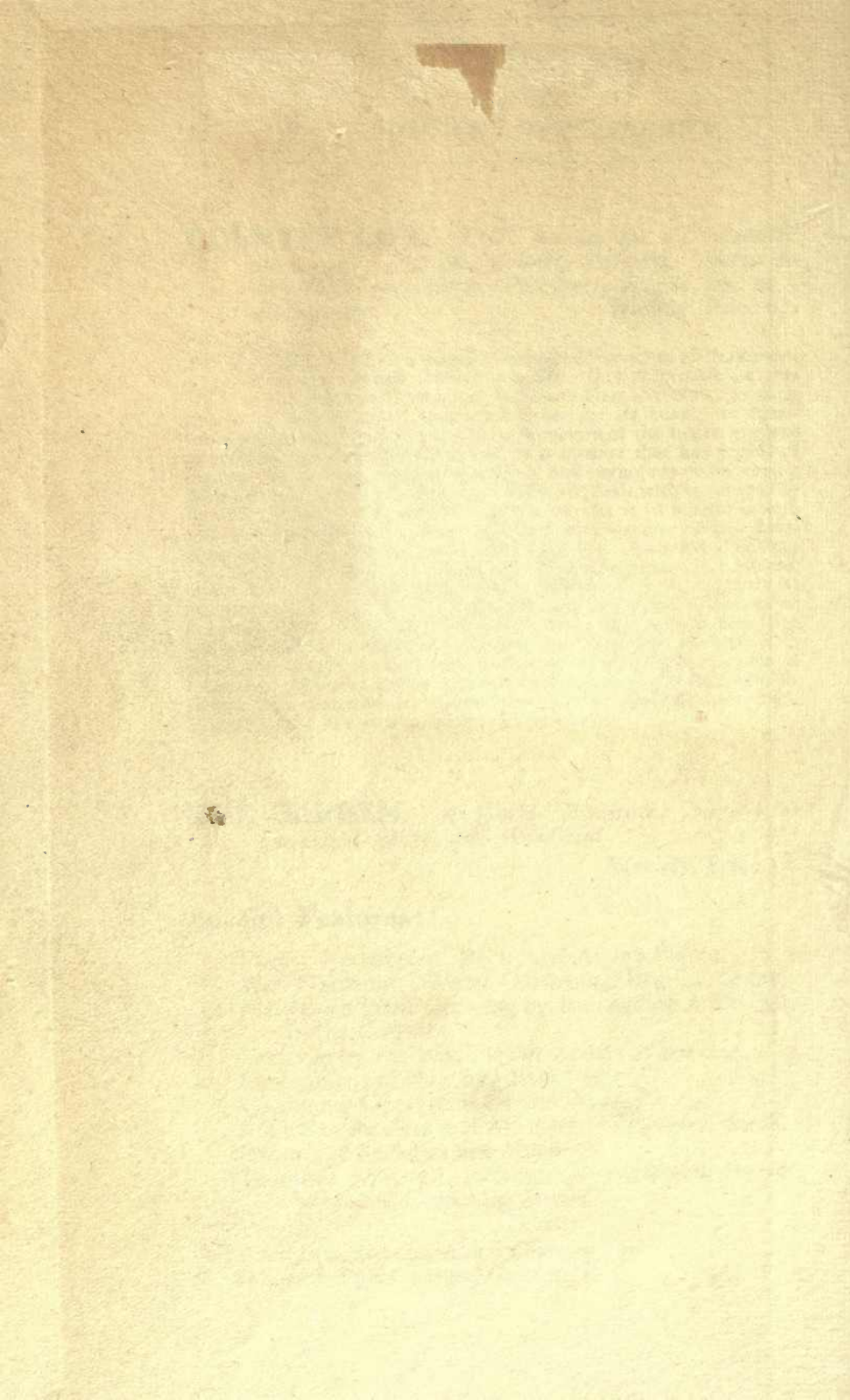
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